



FRIDAY, APRIL 30.

Trials of Freight Train Brakes.

The Committee on Freight Train Brakes of the Master Car-Builders' Association met in Harrisburg, Pa., April 28, pursuant to notice, for the purpose of drawing up rules for the forthcoming competitive tests of brakes. At the first day's meeting the conditions were not fully agreed on, but it was expected that they would be finally settled on the following day.

Contributions.

The Pros and Cons of the Coupler Types.

DENVER, Col., March 19, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your editorial article on "The Pros and Cons of the Coupler Types," in your issues of March 5, 12, have, I am very sure, done much toward throwing light upon the question of the comparative merits of the different classes. The articles are the more valuable from the fact of their showing no bias, but affording a most excellent and ample basis for thought upon the subject.

Happening to be one who has given some thought to this coupler question, as to which you must be cognizant, and having seen much in the way of exaggeration, distortion and bias connected with the discussion of it, articles such as the two referred to are positively refreshing.

Being in a position of comparative independence, and desiring nothing save a truthful elucidation of facts in this matter, I will, with your permission and favor, say something in favor of the link type of coupler.

My observation leads me to believe that the best link couplers can, with equal efficiency and automatic properties, be furnished at considerably less cost than "hook" devices.

That couplers of that type will tide over the interregnum of 10, 15 or 20 years, as the case may be, in a more satisfactory manner and with far less danger to life and limb than any others.

That the link has more flexibility in overcoming inequalities in track and road-bed and in starting heavy freight trains.

That in case of damage the means of repair or temporary make shift is more likely to be at hand and available with them than others.

That when uniformity of use comes, if it ever does, their value will be found equal to their adversaries, being equally automatic in their action as to coupling or not, coupling when desired, and, I believe, superior as to uncoupling when required to do so.

The freight equipment of our lines is subject to such severe banging in yards and elsewhere (much of it unnecessary), even to the extent of the destruction of frames of cars, that it is desirable to provide for such carelessness.

The "hook" couplers have been so weakened by slots and pin-holes, to make them interchangeable with the common devices, the continuity of the hook has in this manner been so interfered with it, that in their case entire destruction is constantly imminent, whereas, with the "link" type, the bending or breaking link or pin will prove in general the only injury—one which can be speedily rectified.

Of course sufficient material may or can be used to remedy this, but then will come in the item of additional cost, which must be looked into.

When the issue is squarely made between hook and link couplers for freight service, I have but little doubt but that the latter will sustain themselves in a creditable manner.

I regard the advantages of the link type as so important in tiding over the transition period that I cannot forbear giving an explanation. We will compare any coupler of the "hook" type with a "link" coupler; the hook coupler having from necessity a link for present use in coupling with common draw-bars; the link coupler having in addition the facility of moving its link vertically through 30 degrees of vertical arc from outside the car. In the practical work of coupling, the link is quite as likely to be in the common draw-bar as in the new device.

If the link is in the old-style coupler and needs guidance, as it certainly will, will it not be manifestly more dangerous guiding it into a 2-in. slot in the "hook" than into the open-mouthed link device?

If the link is taken out of the common draw-bar and placed in the automatic link draw-bar, no necessity will arise for guiding the link nor for going between cars until at rest to put in the pin.

This removal of link from one draw-bar to the other in case of the hook will not decrease the danger over that incurred in coupling two common draw-bars.

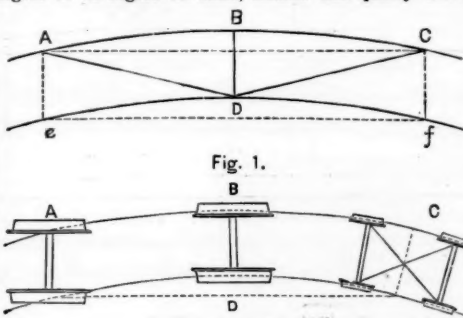
Since I have taken interest in this question more or less correspondence has reached me from unexpected quarters sufficient to make me aware of the existence of meritorious devices that have never reached public notice, chiefly for want of financial means to give them notoriety. If the time ever comes when an earnest desire is shown on the part of railroad managers for the adoption of new devices, some dark horses will come to your notice and meet with favor.

JAS. A. EVANS, C. E.

Widening Gauge on Curves.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I note in the *Gazette* of Feb. 14 that the New England Railroad Club opposes the practice of widening track gauge on sharp curves. I also find an editorial in the same issue virtually indorsing their views on this subject. It is claimed that there is no necessity for widening the gauge because the natural tendency of the trucks to move in a straight line guides the wheels against the outer rail to such an extent that the flanges of the opposite wheels are drawn entirely clear of the gauge line on the inner rail, and that as a result the outer rail is severely worn on the inside of its head, while the inner rail is worn only on top. This is all true in the case of car trucks, but it will not always apply in the case of long-gauged, rigidly-framed locomotives. Several years' experience on one of the crookedest roads in the world (the Denver & Rio Grande—3 ft. gauge) has forced upon me something more than a theoretical knowledge of this subject. We use 24-degree to 33-degree curves on main line, and 35-degree to 40-degree on mine, smelter and quarry tracks.



Our freight trucks have a wheel-base of 3 ft. 3 in., and passenger trucks, 5 ft. The wheels are set from $\frac{1}{8}$ to $\frac{1}{4}$ in. less than common track gauge. Those trucks will turn easily on our sharpest curves without any special gauge arrangement, if not loaded too heavily with an ill-balanced load. Our engines have a wheel-base of 18 ft., and wheel gauge about the same as car trucks. The lateral play of axles, boxes and all bearings will permit of crowding their running gear only about $2\frac{1}{2}$ in. out of a straight line. That is, while the flanged wheels at both ends are held firmly to one side, those in or near the middle may be forced $2\frac{1}{2}$ in. in the opposite direction. An 18-ft. chord connecting with gauge line of outer rail on a 30-degree curve (3-ft. gauge), will show a middle ordinate of about 4 in., or, say, $1\frac{1}{2}$ in. more crook than our engine can accommodate itself to. For, while both ends of the engine are bearing hard against the outer rail, its tendency to maintain itself in a straight line will cause the flanged wheels in the middle to crowd against the inner rail, and in this case the engine would climb over the outer rail at the leading end, spread the track, or tip one of the rails outward from centre to bring itself $1\frac{1}{2}$ in. nearer to a straight line than the excessive crook in the track would allow, unless we removed the lateral strain by widening the gauge enough to compensate for the $1\frac{1}{2}$ in. deficiency in the lateral play of the engine. The accompanying sketches will illustrate the case more clearly (figs. 1 and 2). Fig. 1 shows the lateral bearing points of an engine against rails on sharp curves; A and C represent both ends of an engine against outer rail, while the middle is crowded against inner rail at D. In fig. 2 the hind driver A and pilot truck C are held inward by the outer rail, while drivers B D are forced outward by the inner rail at D. I have witnessed instances where the inner rail pressed the wheel D toward the track centre with force sufficient to raise the opposite wheel B several inches off the rail. On other occasions I have seen unfilled or poorly ballasted track on sharp curves shifted several inches from side to side with a snake-like movement as an engine passed over it. In those cases the pilot wheels C (fig. 2) moved the track out, driver D pulled it in, and driver A gave it a final kick out when leaving. If the engine was stopped and track examined, the 18 or 20 ft. sections of curve covered by the engine would be found flattened down in the middle and kinked out at both ends. Of course such usage would spoil the general alignment of the curve every time an engine passed over it.

I believe there are but three ways to overcome difficulties of this kind, viz.: Remodel the line and reduce curvature to suit the engine; remodel the engine and increase her curving capacity; or widen the gauge sufficient to prevent the lateral pinching of the engine between the points A, C and D (figs. 1 and 2). The first is not always convenient, and may be exceedingly expensive; the second is expensive and might make the engine unsteady on straight track; but the last costs nothing, as the track can be spiked one or two inches wide as cheaply as to close gauge. This simple arrangement has enabled us to put curves in good working order in cases where it was absolutely impossible to keep our engines between the rails on close gauge.

There is probably no reason why the gauge need be widened for ordinary car trucks, except that in the case of coned wheels it might shift the bearing more toward the apex of the wheel on the inner rail, and thereby reduce the tendency to partly slide the wheels on account of the unequal distance they have to travel on a curve. Neither is there any special object in widening gauge for engines until we reach a degree exceeding their capacity to curve without being pinched by common gauge; but when this is reached the trackman who refuses to widen the gauge will find himself in serious trouble.

CANON CITY, Colo.

D. SWEENEY.

[One hardly has in mind such extreme cases as 30

to 40-degree curves in speaking generally of what is and is not necessary "on curves," but Mr. Sweeney's calculations are a little out. The middle ordinate for any D degree curve, for an arc n stations long, is given by the formula—

$$M = 0.22 n^2 D$$

a very convenient formula, which will not be found in any book and which is very easily remembered, as well as well worth remembering, as it enables one readily to determine, for example, what the middle ordinate of an 18-ft. arc on a 30-degree curve is, viz.: $0.22 \times 0.18^2 (0.00713) \times 30 = 0.214$ ft. = 2.57 in.

instead of 4 in., as given by Mr. Sweeney. This is almost exactly equivalent to the limits of play ($2\frac{1}{4}$ in.) which he states. There are, moreover, three ways of obviating the difficulties to which Mr. Sweeney refers, besides the three which he gives, viz.:

1. The use of blind or unflanged drivers, in effect shortening the flanged wheel-base materially.
2. Laying another rail on curves alongside of the main rail and as near to it as possible, so as to help support the blind drivers when they have a dangerously bad bearing on the main rail. This device is in extensive use on narrow-gauge and other lines on very sharp curves, and we think it is on the Denver & Rio Grande also.
3. The swing-motion of trucks, to which our correspondent probably refers in his "lateral play of axles, boxes and all bearings," but which has a very different effect from mere lateral play, since it permits the driving-wheel base to assume a more nearly radial position on curves.

From the combined effect of these causes, the greatest real difficulty is to take proper care of the blind drivers, which is not assisted by widening the gauge on all ordinary curves, although for curves of over 20 degrees, a certain amount of widening may be expedient. That as much as 2 in. is ever expedient we do not believe.—EDITOR RAILROAD GAZETTE.]

The Australian Bridge Contract.

We reproduce in this issue, from *Engineering*, a very interesting, and, to Americans, certainly very gratifying comparative sheet of the designs submitted for the new Hawkesbury Bridge, in New South Wales, in which it will be seen that of the three American designs submitted, all by firms of first-class standing; the most costly of the three—that of the Union Bridge Company, of New York—which was the one selected, is far cheaper than even the cheapest of the foreign designs, prepared by the same specifications and judged by the same men. Reason enough why this should be so, as respects most of the foreign designs, is evident even in the skeleton outlines shown, which we have discussed in another column.

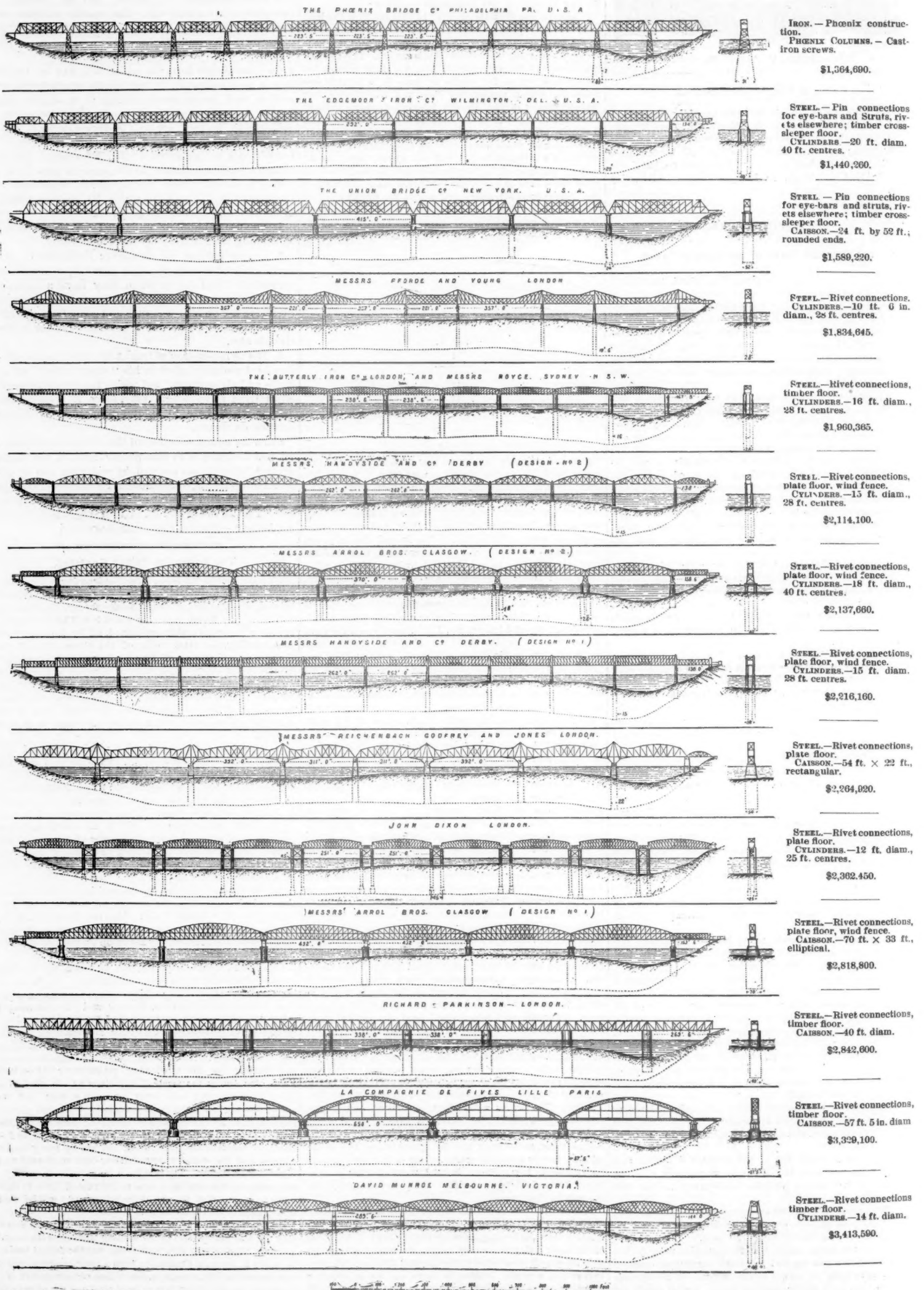
We reproduce also a map of the Australian railroad system and of the site of the bridge. It will be seen that the Australian railroads, for the most part, are mere spur lines connecting the coast with the interior, with a limited number of lines parallel with the coast, connecting the various settlements with each other. These settlements will be seen to be a mere fringe upon the edge of the island, or rather the continent, which is about six-sevenths of the size of the United States, with a population considerably less than 3,000,000, about three-fourths of which is in the four colonies shown on the map.

The Hawkesbury bridge is on the most important extension now under construction, the Southern & Northern Junction Railway of New South Wales, about 90 miles in length, starting from the existing railroad running out of Sydney and crossing the Hawkesbury River on its route to join the northern system at Newcastle.

The bridge, when completed, will be much the greatest work of its kind in the southern hemisphere. The point of crossing selected (see map of site annexed as well as general map) is about 36 miles from Sydney and 15 miles inland. After passing over a shallow branch of the river by a minor structure, the railroad enters a tunnel through Long Island, and emerges on the bank of the main channel about 45 ft. above high water. After passing over the bridge it enters a side cutting on the projecting promontory of Mullet Point, and leaves the bank of the river at the head of a short creek running back from the main stream. At the site of crossing the scenery is extremely wild and picturesque, high rocky cliffs generally springing direct from the water's edge, backed by hills rising to 600 ft. close to the river, the banks of the latter being cut up by many water courses, and the country round being still uncleared and covered with timber. The tide has a range of 3 ft. to 7 ft. and under certain conditions runs at the rate of three to four knots an hour. Near the site of the bridge there will be seen to be ample depth for the largest vessels.

Designs were publicly advertised for by the Colonial Secretary in this journal and in the leading European technical journals, about a year ago, specifying that the bridge was to be 2,896 ft. between abutments, with a clear headway above high water of 40 ft., to carry a double line of railway 4 ft. 8 $\frac{1}{2}$ in. gauge, the superstructure to be of steel and the piers to be founded at an indicated depth, in some cases 170 ft. below water level.

In response, the fourteen designs illustrated by the accompanying engraving were received by June 1 last, the amounts of the bids (excluding the Phoenix Bridge Com-



COMPETITIVE DESIGNS FOR THE HAWKESBURY RIVER BRIDGE, NEW SOUTH WALES.

Character of Superstructure and Foundations Indicated at the Side.

pany's offer, which was for iron, of \$1,364,690) ranging from \$1,440,260 by the Edgemocr Iron Company, of Wilmington, Del., to \$3,413,590, by an Australian engineer, and the time for completion from two to four years.

The award of the contract to the Union Bridge Company was recommended both by the Committee of Engineers appointed to select one design, and by Sir John Fowler, K. C. M. G., the consulting engineer to the colony.

Local requirements and additions recommended by the Committee may somewhat modify the details of some of the parts and so increase the cost, but allowing for these additions the Committee reported that they still considered the selected tender the most economical of those which complied with the conditions, and met their views of stability.

Engineering says, in discussing the designs:

⁴⁴ A bare glance at the designs shows either the piers are unnecessarily massive in some cases, or undoubtedly too slender in others; this great want of uniformity is due no doubt to a limiting pressure on the foundations not being specified in the conditions, though minute instructions were given for the superstructure. It seems probable that this lack of information or conditions regarding the doubtful and most costly portion of the work, may be a reason why so few firms known as bridge builders appear to have availed themselves of the opportunity of tendering, so reducing the competition to the disadvantage of the colony."

"We cannot help expressing our regret that so few high-class designs were received. The majority either fail to fulfill the conditions or have been carried out in a manner that left no chance of success. In a case of this kind, where the distance was too great to expect contractors to make a personal examination of the site, a higher class of design and a greater equality in the amounts of the tenders would have been attained if the conditions had included the alternative of either contractor's tenders on their own plans, or upon one by the Engineer-in-Chief for Railways, whose success in other works and long local experience could not fail to have been embodied in his design, giving confidence to those who no doubt under these circumstances would have tendered, and assisting others who proposed modifications or alternatives, and so enabling a selection to be made from the majority instead of the minority of firms capable of carrying out so important a work."

If the purpose of these comments of *Engineering* is to let our engineering friends abroad "down easy," they are appropriate enough, but if they were intended as a hinted explanation for the conspicuous difference in the cost and merit of the designs, we fail to see the justice of them. Six out of eight of the English designs, at least, are by firms of recognized standing, the Butterfly Iron Co., Messrs. Handyside & Co. (two designs), Messrs. Arrol Brothers (two designs), and Mr. John Dixon, and the same is true of *Compagnie de Fives Lille*: the only French competitor. This is certainly enough to justify *Engineering's* own statement that "in addition to the selected bridge we hope to illustrate shortly as typical of *Continental and British practice* those designs specially commended by the Committee and Sir John Fowler."

The piece of line on which this bridge occurs is further described by *Engineering* as follows :

"This length of 90 miles is being built as a first-class double line of railway in anticipation of the traffic not only between the two principal business centres of the colony, but that which may be expected to follow the opening of the through route between South Australia and Queensland.

"The construction of a railway in proximity to the east coast necessitates some very heavy works, but its importance

as a communication between the Southern and Northern railway systems of New South Wales fully justifies an outlay in excess of the ordinary mileage cost of existing lines.

"The works now in hand on this length have considerable

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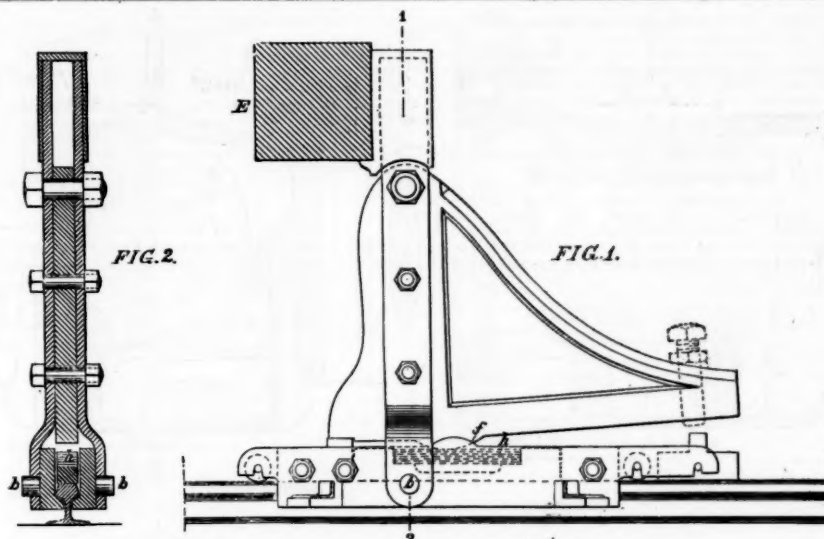


Fig. 3.
BONZANO'S PORTABLE BUFFER STOP.



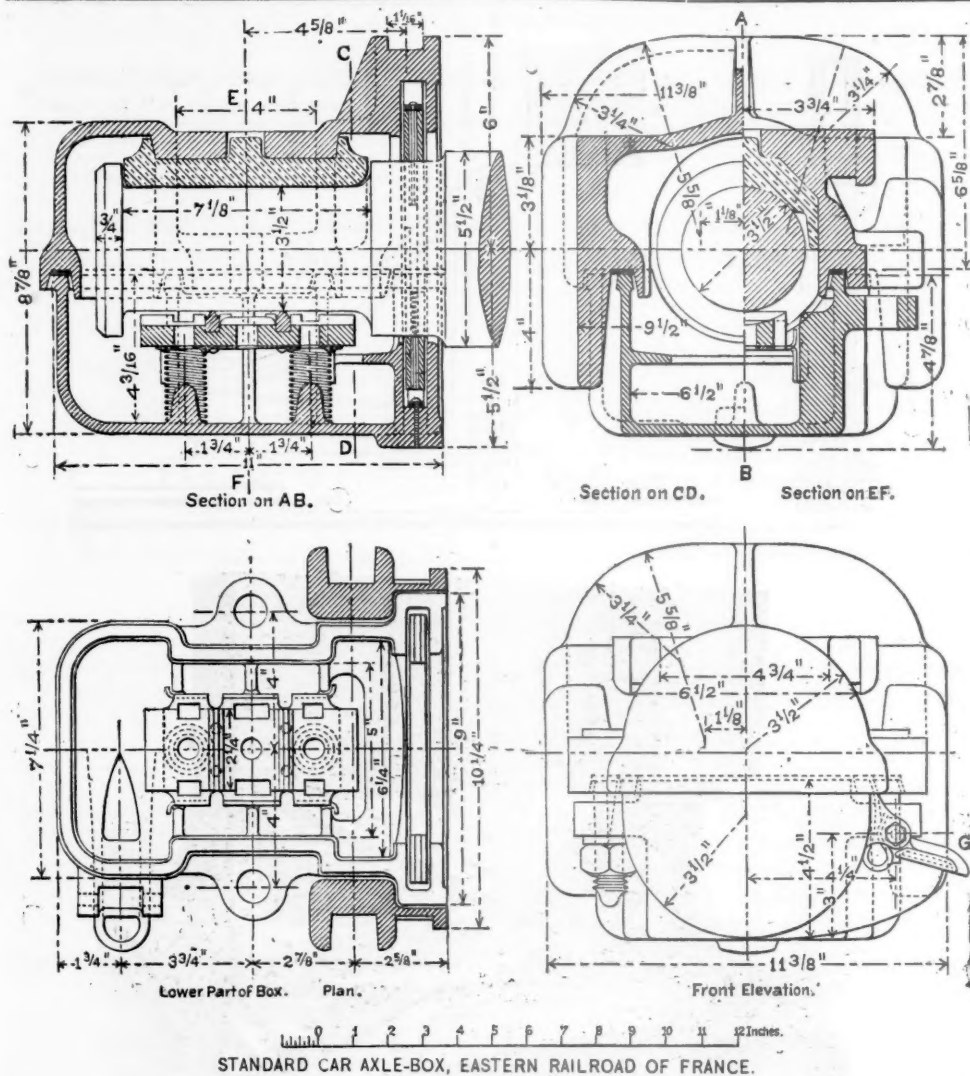
of timber trestle-work approaches, twenty-six openings of 60 ft., with wrought-iron girders, are used for crossing the creeks, which become flooded in the rainy season."

Bonzano's Portable Buffer Stop.

The accompanying illustrations represent a portable buffer stop recently patented by Mr. Maximilian F. Bonzano, of Philadelphia. Fig. 1 is a side view, fig. 2 a cross section, and fig. 3 a perspective view of this device.

The principle on which it acts is very simple. Gripping pieces placed beneath and above the head of the rail and pulled together when the bumper is struck, and the consequent friction, offers a considerable resistance to the further progress of the engine or train.

The way in which the details are worked out is very ingenious. The shoes which grip the under side of the head of the rail are provided with studs *b*. These studs form the hinge on which the upper part of the stop block swings, the connection being made by long straps, as shown. Each of these shoes is made in two parts fastened together by transverse bolts, the heads of which can be seen in figs. 1 and 3. When the buffer is struck by an engine or car, the upper part of the stop block is forced backward, hinging on *b*, and consequently the projection *f* is forced down on the stiff spring *A*, which lies in a recess on the top of a block or shoe bearing on the upper surface of the head of the rail, which is, therefore, gripped between the top and bottom shoes. When the stop block is in its normal position, as shown in our illustration, that is, not resisting the push of a train in motion, the weight



of the bumper beam causes the whole upper part of the stop to rest, by means of a stop just under the bumper, on the frame which confines the top shoe. This frame as shown rests on rollers, and therefore the device can be easily moved.

Another shoe on the top of the rail is situated at the extreme rear of the device, and comes into operation when the upper part of the stop is forced clear back, and the consequent friction helps to arrest motion. The set screw shown in dotted lines in fig. 1 can, if necessary, be used in connection with this.

Many modifications in detail are possible, and the stop block may be used as shown in fig. 3, two devices sliding on ordinary rails, or a single device may be used on a central rail.

Standard Car Axle-Box—Eastern Railroad of France.

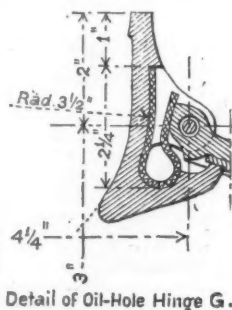
We published recently (Dec. 4, 1885, page 771) illustrations of the Saxon standard axle box. With this we illustrate the standard axle boxes of the Eastern Railroad of France, for which we are indebted to the *Revue Générale des Chemins de Fer*.

This is similar in its general arrangement to the German box, but omits the upper reservoir. In giving his reasons for omitting the overhead reservoir, the designer refers to a plan by Mr. Dietz, in which solid grease is placed in the upper reservoir with the idea of having it do oiling work only in case of heating. This plan is complained of because the oil frequently ascends into the upper reservoir even before heating has begun, and, furthermore, the grease when melted chokes up the oiling cushion below the journal. An oil reservoir above was also discarded on the ground of experiments—agreeing perfectly with those of Mr. Beauchamp Tower as to the action of the oil from such reservoir. That is, the oil is found to rise from the journal into them rather than to feed downwards from them.

These experiences certainly tend to discredit the advantages said to have been found by the German authorities in the use of these reservoirs. On the other hand, it would seem that in case this view of the matter is correct, the upper reservoir must tend to remain constantly overflowing full—a fact which could hardly have escaped attention and must have excited doubt as to their utility.

The axle-box guides are given a play of 5 mm. or $\frac{1}{16}$ in. in the grooves on the box, and the latter are extended downwards by projections on the upper half of the box in order to secure sufficient guiding length without interfering with the removal of the lower half of the box. The two parts of the box are held together by bolts with a rounded thread, which has been found to stand the shocks of traffic better than a triangular one. In order to lock the nuts Grover's patent washers are used, a contrivance which is very similar to our Verona track-washer. A leather joint is made between the two halves of the box. The bottom of the lower half is made flat to avoid spilling the oil when the box is taken apart and the lower half set down.

The lower half is furnished inside with a partially horizontal diaphragm in the portion toward the wheel, for the purpose of preventing the forcing out of the oil by violent side blows. These precautions have proved so efficient that the consumption of oil for these boxes has fallen from 2.3 ounces per 1,000 miles to less than one fourth that amount (41.25 grammes per 1,000 kilometres to 9.93)—a most remarkable showing if it can be obtained on a large scale. Such a marvelous contrast to the results obtained here is only possible with a practically perfect dust-guard. This is formed of five to six thicknesses of fluffy woolen cloth, held between two leather diaphragms by screws like those used for shoe soles.



The diaphragms are in halves, and are pressed up against the axle by steel springs behind them, and the leathers on opposite sides of each half diaphragm break joints with those on the other half.

The cloth is introduced to prevent the whistling otherwise caused by the shields at low speeds.

The wings shown on the bearing below the bearing surface are to hold it more effectually against displacement by switching shocks, in which they are assisted by a lug cast on the top of the bearing. The inner surface of the bearing is entirely free from groovings of any sort for assisting distribution. The chord of the bearing is proportioned to make it about eight-tenths of the journal diameter. The oiling cushion in this box differs from the German one in having two springs instead of one, and in having no interior reservoir inclosing the wicks, which in point of fact seems a rather unnecessary refinement where the oiling is done by a wick, and the filling-hole of the box is so small and so little liable to let in dirt. It furthermore has its oiling plush firmly tacked to a beech block, and to this plush are fastened several little tufts projecting above its surface and keeping the plush from matting down by too hard pressure against the journal.

The plush is of wool with a long silky warp.

The instructions for adjusting bearings prescribe that the sharp longitudinal edges shall be replaced by windings; that there shall be an end play of 2 mm. (a full sixteenth inch);

and that the bearing shall not press against the end shoulders of the journal.

Bronze bearings must not remain in service after their thickness is reduced to 10 mm. ($\frac{3}{8}$ in.) nor after their end play has increased to the same figure.

Foreign Technical Notes.

A street railroad in Leipsic has been trying a locomotive of the Honigsmann caustic soda system, so far as reported with satisfactory results. The trials were to be continued until the engine was proved to be economical before adopting it.

In Germany, the production of pig-iron last February was 272,181 tons, against 296,967 in the corresponding month of last year—a decrease of 24,786 tons, or 9 per cent. The decrease from January of this year was very nearly the same.

The principal locomotive, car and machine works of Austria have notified the Minister of Commerce that for lack of orders they find it necessary to discharge a large part of their workmen. In order to avoid such a calamity, they ask the government (which has a few railroad lines of its own) to give out now orders for the rolling stock which it will want delivered next year. In this way the manufacturers could keep their good workmen for a time, at least. The Minister has asked these manufacturers to confer with him.

Ship-building is exceptionally dull in Great Britain. The tonnage launched during the three months ending with March has been for ten years:

Year.	Tonnage.	Year.	Tonnage.
1877.	40,400	1882.	70,210
1878.	62,350	1883.	83,617
1879.	53,281	1884.	63,309
1880.	43,555	1885.	38,316
1881.	61,884	1886.	28,669

Last year the production was smaller than in any other of these years, but this year it is 25 per cent. less than last year.

The management of the Austrian State Railroads has adopted the Sedlaczek electric head-light for a local road, and five locomotives are to be equipped with it directly. This light has been used experimentally on an Austrian railroad since 1883. It throws forward a cone of light so intense that objects of some size, like men, animals, etc., can be seen at night more than half a mile in front of the train, and enables the enginemen to distinguish exactly the position of switches on entering stations at a distance of 1,000 to 1,300 ft. A simple mechanism enables the engineman to turn the lamp so as to throw its light at an angle with the direction of the engine, up to 45 degrees, and therefore to examine the track on curves long before entering them. In Europe it is recommended especially for "secondary" railroads (local lines with light traffic), because these lines do not have the large force of track watchmen and inspectors who make running in the dark pretty safe on the "full" railroads there.

In the course of the year 1885 the tests prescribed by law in Austria were made of 188 locomotives, of which 93 belonged to the State Railroads. Of these 188 locomotives, four were built by a Bavarian establishment; the others by four Austrian works—71 of them by the Wiener Neustadt works, 48 by the Vienna shops of the Austrian State Railroad Company (which owns lines bought many years ago from the government), and also 48 by the Floridsdorf Locomotive Works, and 17 by Krauss & Co., at Linz.

These locomotives were classed as follows: Express, 44; passenger, 16; freight, 99; "secondary train" (light, local trains), 29. Of the whole number 58 were tank locomotives and of the others there were 35 with three axles and 95 with four; 58 had two axles coupled, 24 three and 48 four, while of the tank engines 24 had two axles, 25 three and 9 four; the number with two axles coupled was 27; with three, 22, and with four, 9. Every locomotive had two injectors. Most of them had inside frames and outside cylinders and valve gear, the latter of the Stephenson, Gooch and Allan systems. With the express and passenger locomotives the non-automatic Hardy vacuum brake was commonest.

The greatest wheel-base, 19 ft. 8 in., was that of the express engine of the Southern Railroad, which has a Bissel truck. The smallest wheel-base was only 3 ft., on engines with 23 in. drivers, for a factory railroad. The greatest diameter of driving-wheel was 6 ft. 3 in., for express engines.

The greatest speed attained in any test was 71 $\frac{1}{2}$ miles an hour, by one of the express engines, with 6 ft. 3 in. drivers and 19 ft. 8 in. wheel-base; but the greatest average speed was by a passenger engine of another road, and amounted to 46 miles an hour.

TECHNICAL.

The Franklin Institute.

The special committee on the future work of the Franklin Institute, and also to prepare plans for a suitable building in which to carry on that work, made its report at the monthly meeting last week. It provides that all the property of the Institute be vested in seven trustees, to be held for the benefit of the institute at large. Any surplus remaining in the treasury at the end of any fiscal year shall be invested in the endowment fund. The trustees are authorized to borrow money, if necessary, and create a lien on the new building. The library shall have a capacity for the accessible display of 60,000 books, with a separate room for the specifications of patents and separate rooms for consultations.

A smaller lecture room to hold about 500 persons is proposed, with attached laboratories for physical and chemical apparatus and lantern display, and a mechanical laboratory with electrical appliances and a good gas or steam engine, with an electric plant extending throughout the building. There should also be a large lecture hall to hold from 1,500 to 1,800 persons. It is suggested that the institute should establish in connection with the drawing-school a school for

handicraft to teach the underlying principles of the several trades.

In conclusion the report said that plans for a building could not be determined until action had been taken by the institute on the suggestions made. The report was unanimously adopted and the committee continued. The members of the committee are William P. Tatham, William Sellers, J. Vaughan Merrick, Charles Bullock, Isaac Norris, John J. Weaver and Charles H. Banes.—*Philadelphia North American*, April 22.

Raising the Approach Girders at the Forth Bridge.

The raising of the approach girders on the south side of the Forth Bridge was to have been commenced on Monday, but owing to the bursting of one of the hydraulic jacks the work had to be postponed for a day or two. There are seven spans ready to be lifted, and as each span weighs from 210 to 220 tons, there is a total weight of close upon 1,600 tons to be operated upon by the hydraulic machinery, taking into account, of course, the other material. The total length of the girders to be raised is about 1,200 ft. They rest upon seven piers, which will be built up under them till they have been raised to their permanent height of about 150 ft. above high-water mark. This will be accomplished by stages of 3 ft. 6 in. at a time. The girders will be raised in the first place to that height above the mason work by the hydraulic jacks and propped up by blocks of wood. Two courses of mason work will then be built up under them, and when the mason work sets, the same operation will be repeated. Judging from the rate of progress at the north side of the works, where the approach girders have been raised 20 ft., each stage will occupy eight days, and it is expected that during the summer at least the work will progress at the rate of 14 ft. per month.—*Engineering*.

Western Society of Engineers.

At the last meeting of this society in Chicago, President Wright in the chair, Frank Lawlor and Ferd. Hall were transferred to the grade of members. Messrs. Horace C. Alexander and Orlando H. Cheney were elected members.

Mr. Cooley, for Committee on National Public Works, reported progress.

Mr. Gottlieb, for Committee on American Society of Mechanical Engineers, recommended that a committee of six be appointed as a reception committee, and that the society offer its hall for the use of the convention May 25, 26, 27 and 28. It was voted that the recommendations of the committee be adopted and that the present committee should add three members to its number and be the reception committee.

The Secretary read a memoir of Edward B. Talcott, by Mr. Willard S. Pope.

The President announced standing committees as follows:

1. Surveys and Topography, Chas. MacRitchie, Z. A. Enos.
2. Materials, O. Chanute, A. W. Cooke.
3. Construction, Allan D. Conover, J. T. Dodge.
4. Bridges, Maurice Seifert, George R. Bramhall.
5. Transportation, Railroads, Canals, etc., C. H. Hudson, H. C. Alexander.
6. River and Harbor Improvement, H. B. Herr, G. A. M. Liljencrantz.
7. Water Supply, Sewerage, etc., Samuel McElroy, J. A. Cole.
8. Fuel, Heat for Industrial purposes, John Zellweger, W. S. Bates.
9. Lighting, Heating and Ventilating Buildings, J. M. Howells, R. F. Hartford.
10. Mining, C. E. Billin, Irving A. Stearns.
11. Tools and Machinery, W. H. Lotz, J. Salter, Jr.
12. Jurisprudence of Surveys, C. W. Irish, A. V. Powell.
13. Weights and Measures, Chas. Latimer, L. E. Cooley.
14. City Engineering, Samuel G. Artingstall, W. F. Goodhue.
15. National Public Works, L. E. Cooley, H. B. Herr, A. W. Wright.

A paper on Long Span Bridges, by Mr. J. F. Clarke, was read by Mr. Hall. A criticism was read by Mr. Gottlieb.

The two papers were referred to the Committee on Bridges.

A paper on a Time Table for Lighting Street Lamps, by Mr. J. M. Howells, was read by Mr. Cooley.

At the May meeting a paper will be read by Mr. Chanute on the Preservation of Timber. Advance sheets will be sent to members willing to discuss this paper.

Engineers' Club of Philadelphia.

A regular meeting was held at the Club house in Philadelphia, April 17. President Washington Jones in the chair; 27 members and 1 visitor present.

Mr. J. S. Elliott presented a discussion of the recent paper by Mr. C. W. Buchholz upon Engineering: Its Achievements and Its Reward.

Mr. H. W. Sanborn made some remarks on Recent Steam Gauging for the Future Water Supply of Philadelphia, describing the methods used, and why they were adopted, illustrated by numerous drawings and photographs, and the automatic recording gauge. The streams gauged were the Perkiomen Creek and tributaries in Montgomery County, the Nesquehanna and tributaries and the Tobicon in Bucks County.

Mr. E. V. d'Inville spoke upon the geological position, characteristic features and method of mining the ore at the Cornwall Iron Mines, Lebanon Co., Pa., illustrating his remarks with several maps and cross-sections, and a relief model of the mines and contiguous territory, constructed by Mr. A. E. Lehman.

The ore deposit occurs in three hills, five miles south of Lebanon, whose summits are 870, 715 and 700 ft. above tide, Lebanon being 471 ft., and Cornwall, at the base of the Middle Hill, 575 ft.

The extreme length of this magnetic ore deposit is 4,400 ft. in a general east and west line; its breadth in Big Hill 400 ft.; in Middle Hill 800 ft., and in Grassy Hill 600 ft.; and its area is about 63 acres.

The ore is surrounded on three sides by a steeply sloping wall of dolerite (trap) rock over 100 ft. thick, the Mesozoic sandstone abutting against the southwest dipping ore on the south side of the deposit.

The ore was referred to the lime-shale transition layers between the Siluro-Cambrian limestone and the Hudson River slates; is magnetic, practically free from phosphorus, but contains considerable sulphur and some copper, and, except in the soft surface ore, all requires roasting before it is worked in the furnace.

There are three commercial grades of ore, but the bulk of the output is the No. 3 "select ore," mostly lump, with about 48 per cent. of iron and 2.5 to 3 per cent. sulphur.

Mining at present is carried on entirely above water level, though the records of several bore holes have established the great depth of this deposit beneath the water plane, bore hole No. 4, in the east end of Middle Hill, being down 325 ft. below the surface, or to 282 ft. above tide, without any trap or other foot vein being struck.

The ore is mined in successive terraces and slopes, as in huge open quarries, and by means of six compressed air drills large quantities can be mined on short notice. The output for 1885 was 508,864 tons, and up to Jan. 1, 1886, about

7,000,000 tons have been mined. Probably 30,000,000 tons can still be taken out above water level.

Mr. A. E. Lehman then exhibited and described the method of construction of the model of the above mine. It is built entirely of layers of cardboard, the perpendicular edges of which are brought to slope by engraving tools. It was so constructed that the accurate location of the contour lines was preserved, and they were drawn in ink on the finished surface, adding greatly to its practical value and intelligibility. Property lines, railroads and other topographical features and areas are shown in ink and color. The whole work is one of remarkable neatness.

Boiler Explosions in 1885.

The *Locomotive* gives the following classified list of the explosions which have occurred in this country during the past year, so far as it has been able to obtain them, together with the number of persons reported killed and injured thereby.

"The total number of explosions reported was 155, which caused the instant death of 220 people, and the serious injury of 288 others, many of the latter being mortally injured:

CLASSIFIED LIST OF BOILER EXPLOSIONS IN THE YEAR 1885.

	January	February	March	April	May	June	July	August	September	October	November	December	Total per class
Saw-mills and wood working shops	5	2	4	3	3	2	2	2	3	4	1	2	33
Locomotives	2	4	2	1	1	1	1	1	1	2	1	1	16
Steamboats, tugs, etc.	2	2	1	1	1	1	1	1	3	2	4	1	16
Portables, hoists and agricultural engines	2	5	3	2	1	1	1	3	1	1	1	1	20
Mines, oil wells, collieries, etc.	1	1	1	1	1	1	1	1	1	1	1	1	12
Paper-mills, bleachers, digesters, etc.	1	1	1	1	1	1	1	1	1	1	1	1	12
Rolling-mills and iron works	1	2	1	1	1	1	1	1	1	1	1	1	12
Distilleries, breweries, sugar-houses, dye-houses, rendering establishments, etc.	3	1	1	1	1	1	1	1	1	1	1	1	12
Flour-mills and elevators	3	1	1	1	1	1	1	1	1	1	1	1	12
Textile manufactories	3	3	2	2	1	1	1	1	1	1	1	1	12
Miscellaneous	3	3	2	2	1	1	1	1	1	1	1	1	12
Total per month	14	20	14	7	12	12	10	9	11	14	15	17	155
Persons killed, total 220, per month	24	22	20	9	18	14	7	11	11	19	34	31	220
Persons injured, total 288, per month	35	30	28	9	31	21	21	13	21	34	22	21	288

"As usual, the greater number of explosions have occurred among boilers used in saw-mills, 21.3 per cent. of the total being in this class.

"Mines, collieries and similar boilers stand second in frequency, 20 being the recorded number.

"Distilleries and similar establishments are third, with 18 explosions to their credit.

"Marine boilers, and those of a portable type come next, with 16 in each class.

"Locomotives, rolling-mills and iron works, and flour mills and grain elevators follow with 10 each to their credit.

"As was the case the preceding year, but one explosion in a textile manufactory of any kind was reported. Taking into consideration the large number of boilers of this class in the country, two things would seem to be proved thereby: First, that boiler explosions might be almost entirely prevented by proper means; and second, that as a general rule, boilers in this class of manufacturing establishments have most excellent care."

Pole Road Locomotives.

A trial of a pole road locomotive, built by the Tanner & Delany Engine Co., of Richmond, Va., was given at the works of the company, April 20, in the presence of a large number of railroad men, lumber manufacturers and others interested. The engine, it is claimed, will draw a train of 6 loaded cars at a speed of 5 or 6 miles an hour, over very heavy grades and on a pole road of the ordinary rough construction. The company has a number of orders on hand for these engines, and have already quite a number of them at work. These boats are constructed on the plan devised by Mr. W. E. Cole, of Mobile.

American Steamboats for Mexico.

Col. Robert Simpson is preparing to place an order for some six or seven steamers to be used in Mexico. He is interested in the company, which is known as the Compañia de Navegacion del Lago de Patzcuaro. Lake Patzcuaro is situated near the centre of the country and the Mexican National road runs past it. The steamers are to be used on this lake. James Rees & Sons have made bids on the first steamer. Six boats will be used by the company on this lake, and all will be made in Pittsburgh. The steamers are to be used in transporting cattle.—*American Manufacturer*, Pittsburgh.

Rapid Transit for Paris.

The government laid before the Chamber yesterday the Paris Metropolitan Railway bill and the provisional agreement entered into between the Minister of Public Works and M. Albert Christophle, the Governor of the Crédit Foncier. The capital of the company will be 50,000,000. The management will be entrusted to a board of 12 members, 8 elected by the shareholders and 4 named by the government, which has reserved two of these seats to the Municipal Council of Paris. Alongside of this board, and representing alike the interest of the shareholders, the government and the city of Paris, there will be a governor named by the state, who will have a right of veto, in this respect resembling the organization of the Bank of France. The objects kept in view in the plan are the easy conveyance of passengers and goods, the direct communication of dispatches to the General Post-Office, and the union of the great lines of railway. The plan comprises (1) an inner circle line along which the rails will pass, according to the nature of the ground traversed, underground, through cuttings or over viaducts; (2) two great arteries destined to connect the stations of the great companies and intersecting Paris. One underground line will connect the Gare de l'Est, pass through the district of the General Post-Office and Halles, and terminate at Mont Parnasse station; the other, which will be above the surface level, will connect with each other (1) the Saint-Lazare and the Nord stations by a line which will pass through the Carrefour Drouot; (2) the two stations so united of the west and north with the Vincennes and Lyons stations by means of a line passing from the Carrefour Drouot and leading toward the Avenue Daumesnil by crossing the district of the Halles, which, serving as a point of intersection of the above-ground artery and the underground artery, will thus have exceptional advantages. The contemplated stations number 64, of which 28 are to be on the viaduct, 15 over open cuttings, and 21 over the underground way. The government intends to divide the various works just referred to into two series. The first series will

include those which can be completed before 1889—that is to say, the circles, the underground artery, and the union line of the western and northern stations through the Carrefour Drouot. The second series will include the construction of the overground artery which is to connect the Carrefour Drouot with the Vincennes station. The division of these two series will correspond very closely to the equal division of the total expense. The Minister of Public Works has considered it prudent to begin with those operations which are sure to be completed before the exhibition. On the other hand, the construction of the central artery will make several changes necessary in the direction of streets and roads to be carried out by the city, and it has, therefore, been thought wise to give the municipality time to study and prepare for them. It is estimated that the works constructed, the cost of property acquired, interest, and, in short, the total expense will amount to from 450,000,000 to 475,000,000. Of this total the first series of works—that is to say, the construction of the underground artery, the circular line, and the union of the western and northern stations—will require 225,000,000. The above-ground artery alone will absorb the rest, the appropriation of property in the heart of Paris making the establishment of this central line very costly. The state gives a guarantee of 4 per cent. on the total expense; but it believes that by an arrangement it has made it has considerably diminished the burden of this guarantee.—*Paris Correspondence of London Times*.

Progress of the New Croton Aqueduct Tunnel.

The Ingersoll Rock Drill Co., has recently issued an advertisement (and certainly a most effective one) a statement showing in detail the progress of this work in the four months since the appearance of a former statement extending up to Oct. 31, 1885. The present status of the work is as follows:

Total length of the work	33.25 miles
Of which there is in open cut, 3,000 ft., or less than	0.57
Leaving of tunnel	32.68
Of which there is included in the statement	28.25
Of this there was completed, O. T. 31, 1885	4.48
And from Nov. 1, 1885, to March 1, 1886	4.82
Making total progress to March 1, 1886	9.40
And to be completed	23.28

At the present rate of $1\frac{1}{2}$ miles per month at 54 headings (122 ft. per mo. including some not working) this should complete the work in some 19 months, or in the fall (Oct. 1) of 1887. As there are several shafts to be opened shortly, this should increase the rate of progress. The total amount of contracts let thus far is \$13,800,367, which includes all the work connected with the tunnel, of every nature and description, except a gate-house at 135th st.

The manner of working the tunnel is described as follows:

"The air compressors at shaft 10 have 18 by 30 in. cylinders, supplying air at 80 lbs. pressure per square inch, the air being first discharged into a condensing air receiver, where it is freed from all moisture, and then conducted down the shaft and into the headings through 3 and $3\frac{1}{2}$ in. pipe. Each heading is driven by four $3\frac{1}{2}$ in. drills, mounted two on one column, to which they are attached by means of swinging arms which can be moved up and down or around the column; thus with two columns and four machines, the entire face is commanded at one setting of the columns. From 19 to 20 holes, 5 to 6 ft. deep, are drilled for the centre cut and squaring up. Two drills, mounted on tripod, drill from three to five holes 8 ft. deep in the bench, some being vertical and others flat or lifting. The holes are then charged with No. 1 giant powder in the cut and No. 3 in the side and bench, and exploded by electricity.

"The foremen are required to have a round of holes drilled and blasted once each shaft of ten hours, it being left to their judgment to decide the depth of cut they shall undertake to drill, square up, and blast in that time. By this method an average of about 10 lineal feet of tunnel is completed every 24 hours in each face through very hard gneiss and granite. This is a higher rate of progress than is attainable by the deep-cut system, which does not permit of each shift finishing its own work.

"Extending down the shaft is a rough-looking square wooden box, with branches at the bottom, one part extending along the tunnel to one heading, and the other part to the other heading. At the bottom of the vertical portion, exhaust steam is admitted; this produces a strong current along the branches and up the shaft. The smoke resulting from each blast is thus drawn into the boxes and delivered at the top of the shaft."

A large table giving the progress of each heading of each of the 28 shafts for each week is given from the Engineers' records. The following abstract is of more immediate interest, however:

Comparative Table of Average Monthly Progress for the last Four Months Ending Feb. 27, 1886.

Best 10 headings using Ingersoll drills exclusively.	Best 10 headings using drills having next best record exclusively.	Best 6 headings using Ingersoll and other drills together.
9 s..... 231	21 s..... 158.5	23 s..... 200.5
4 s..... 214	13 s..... 150.5	23 s..... 181.8
11 s..... 207.7	20 s..... 147.5	12 s..... 170.7
3 s..... 200.1	14 s..... 146.5	21 s..... 136.5
11 s..... 108.5	15 s..... 136	18 s..... 121.5
10 s..... 104.5	15 s..... 129.2	12 s..... 113.2
5 s..... 187.7	19 s..... 104.8	
4 s..... 186.1	20 s..... 104	
7 s..... 175.7	24 s..... 101	
10 s..... 174.1	18 s..... 93.3	
	1,067.4	1,276.3
Average..... 106.7	Average..... 127.6	

Average monthly progress for the past four months on the entire line (in 45 headings worked continuously) 142.6 ft.

Comparing the averages for the last four months with the reported up to Nov. 1, 1885, the following results appear:

Average monthly progress in best 10 Ingersoll headings for the past four months..... 196.7 ft.

Average monthly progress in best 10 Ingersoll headings up to Nov. 1, 1885..... 119.6 ft.

Increase..... 77.1 ft.

Average monthly progress in best 10 headings using other drills for the past four months..... 127.6 ft.

Average monthly progress in best 10 headings up to Nov. 1, 1885..... 106.7 ft.

Increase..... 20.9 ft.

Weighing Trains in Motion.

A device has been invented by which electricity is made to record the weights indicated upon scales or steel-yards, the application being specially designed for the weighing of freight cars while in motion. It is said that, with this device properly applied to the scales, an accurate account can be kept of the weight of every car passing over them, even at full speed.



Published Every Friday.

EDITORIAL ANNOUNCEMENTS.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

THE AUSTRALIAN BRIDGE COMPETITION.

We present in another column comparative details of the recent competition for the great Hawkesbury bridge in Australia, which will no doubt be examined with no common interest and which are full of instruction, since it is by far the largest enterprise of the kind on which American and foreign engineers have had fair opportunity to enter into competition, under circumstances which would remove even the suspicion which some of the less worthy and less well-informed of our foreign friends are fond of insinuating, that the superior cheapness of American engineering construction is largely, if not wholly, due to inferior solidity or quality.

While it is tolerably clear from the details which accompany the sketches (assuming, as we safely may, that the strain-sheets and other details of the bridge work conformed strictly to the common specifications, in all the designs selected for favorable mention at least) that no other award could have been made with any shadow of justice, unless to the Edgemoor Iron Company, which (under the same assumptions as above) had palpably the second best and a still cheaper design, yet it is to the honor of the awarding engineers that the competition was determined in a spirit of almost phenomenal fairness, when we consider Englishmen were sitting in judgment on an English enterprise to be paid for by English money. One cannot but realize that a scientific spirit must have pervaded the judges, and that the triumph of American ideas could only have resulted from overwhelming superiority. A number of mournful comments on the subject have appeared in the English press, but perhaps the most amusing of all are those which *Engineering* makes in presenting the designs, as given elsewhere, that the great distance from home of the proposed undertaking, and the lack of a design by the Australian Engineer-in-Chief for Railways on which bridge firms might bid without preparing designs of their own, compelled a selection from too few competitors. Perhaps it did, and in view of the untoward result, he is no doubt as sorry as his American competitors are glad that he did not do so; but the probability that a greater number of English bids would have made any particular difference in the result does not seem great after an examination of the following figures. The plans submitted were all pin-connection girders, of course (for a structure of such size) on the part of the Americans, and riveted girders on the part of the English and Continental firms, and show a resulting economy on the part of the former, which must have simply ruled out entirely all consideration of the

latter, and this in spite of the disadvantage which the American competitors labored under in having to pay more for their materials.

The bids in detail were as follows, taking £1 sterling = \$4.86, to which we have added three columns of ratios; one with the accepted bid = 100, one with the average of the American bids = 100, and one with the three highest English bids = 100:

Design No.	Total foundation	Dist. between centres	Total bearing surface, sq. ft.	Average surface, sq. ft.	Country
1. 20 cylinders, 20 ft.	20 ft.	40 ft.	6,383	6,383	American.
2. 8 caissons, 24 x 52	24 x 52	...	6,746	6,514	American.
4. 20 cylinders, 10½ ft.	10½ ft.	28 ft.	1,732	1,732	English.
5. 24 " 16 ft.	16 ft.	...	4,825	4,825	English.
6. 22 " 15 ft.	15 ft.	...	3,887	3,481	English.
7. 30 " 18 ft.	18 ft.	40 ft.	7,634	7,634	English.
8. 22 " 15 ft.	15 ft.	28 ft.	3,883	3,883	English.
9. 8 caissons, 22 x 54	22 x 54	...	9,504	7,009	English.
10. 36 cylinders, 12 ft.	12 ft.	25 ft.	4,072	4,072	English.
11. 7 ellip. caiss., 70 x 33	70 x 33	...	12,090	12,090	English.
12. 8 circ. " 40 ft.	40 ft.	...	10,053	8,941	English.
13. 5 " 57½ ft.	57½ ft.	...	12,983	12,983	French.
14. 20 cylinders, 14 ft.	14 ft.	48 ft.	3,078	3,078	Australian.

It will be seen that the three American and the nine English bids, separately considered, range about as bids may be expected to in an ordinary competition between competitors approximately equal, but that there is a sharp jump from one to the other.

The extent of this jump will be better appreciated when we remember that this is not a competition in iron bridge building only, but in foundations as well. In fact, a very strong reason and probably a controlling reason why the plan of the Union Bridge Company was adjudged the best is at once apparent in its better foundation design, which contemplates a single caisson mass, 24 by 52 ft., instead of twin columns (Edgemoor and most of the foreign designs) or huge screw piles, as proposed by the Phoenix Company. With a depth of water of 70 ft., and with firm bottom at something like 100 ft. deeper yet, it was sound engineering judgment to concentrate the pier mass in one unbroken unit rather than attempt to sink two or more isolated columns, depending on the inherent stiffness of each one against lateral movement. For the grade of the bridge is some 45 ft. above water, in addition to the above, making the total height of piers as nearly as may be 215 ft. above the supposed base. A slight conception of this great height may be had when one thinks of Trinity Church steeple, which is only about 60 ft. higher to the top of the spire, and then imagines great girder spans resting upon perfectly plumb cylindrical piers of a similar height. It may be bold engineering to undertake to build such piers of isolated units, but it was safer engineering to make a unit of the whole mass, and the board of English engineers were wise in so judging.

It is not until we reach designs so costly as to be quite out of fair competition even with the English designs, that we find among them as solid and stable a foundation as that of the Union Bridge Company. All of the three cheapest English designs, and several of the others, have foundations inferior in stability to that of the Edgemoor Iron Co., the cylinders being only 28 ft. between centres instead of 40 ft., and smaller as well.

Pushing the comparison somewhat further, by determining the total area in square feet of the foundations proposed, we can judge still more clearly of the comparative value received which it was proposed to give for the various stipulated sums. In doing so we must throw out the design of the Phoenix Bridge Company (which shows an ordinary braced pier carried down through the whole depth of water and resting on immense screw piles), for lack of data as to the bearing area. Its design is an unusual and peculiar one. Just how its designers calculated to carry it out is not clear, nor what dictated the immersion of skeleton iron work piers in salt water.

For the remaining designs, we may compute the following comparison of the total bearing area in square feet proposed by the various competitors for the entire structure. Such a comparison is of course a somewhat rude one, because the proper bearing area would vary somewhat with the total weight of the superstructure, but the difference in this respect was not likely to be a very great one, and certainly, so far as it went, would have justified the American competitors in proposing lighter foundations, whereas in fact they proposed far

heavier ones than any near foreign competitors, as appears in the following table:

Design No.	Total foundation	Dist. between centres	Total bearing surface, sq. ft.	Average surface, sq. ft.	Country
1. 20 cylinders, 20 ft.	20 ft.	40 ft.	6,383	6,383	American.
2. 8 caissons, 24 x 52	24 x 52	...	6,746	6,514	American.
4. 20 cylinders, 10½ ft.	10½ ft.	28 ft.	1,732	1,732	English.
5. 24 " 16 ft.	16 ft.	...	4,825	4,825	English.
6. 22 " 15 ft.	15 ft.	...	3,887	3,481	English.
7. 30 " 18 ft.	18 ft.	40 ft.	7,634	7,634	English.
8. 22 " 15 ft.	15 ft.	28 ft.	3,883	3,883	English.
9. 8 caissons, 22 x 54	22 x 54	...	9,504	7,009	English.
10. 36 cylinders, 12 ft.	12 ft.	25 ft.	4,072	4,072	English.
11. 7 ellip. caiss., 70 x 33	70 x 33	...	12,090	12,090	English.
12. 8 circ. " 40 ft.	40 ft.	...	10,053	8,941	English.
13. 5 " 57½ ft.	57½ ft.	...	12,983	12,983	French.
14. 20 cylinders, 14 ft.	14 ft.	48 ft.	3,078	3,078	Australian.

The average of all the English designs is 6,477 ft. against 6,514 ft. for the American—a singularly close coincidence; but where the economy comes in of the three leading English designs which alone approach within 46 per cent. of the American, is evident in this table; it lies largely, if not wholly, in skimping the foundations, which were made to afford only 58½ per cent. of the bearing surface of the American designs, neglecting a further element which ought to be considered, the distance apart of the caissons, which is 28 ft. instead of 40 ft.

Now, in designing structures of this kind, with many succeeding spans, it is demonstrated theoretically that the condition of ultimate economy is to have the cost of the piers equal to the cost of the superstructure. This, it is true, is a mere theory whose absolute correctness we should not care to guarantee, and even if universally true in theory, practical conditions, especially in so remote a region as Australia, would be apt to modify it materially. Nevertheless, while it is not at all likely that any one of the competitors figured out his design on this basis, it is not an unfair assumption that those designs which were properly worked out, according to the various assumptions of cost made, would in some rude way conform to it. If so, or if anywhere nearly so, the American competitors make a remarkably good showing, for the respective bids on this basis (half the total bid allotted to the piers) show the following cost per square foot of base of pier:

—American—	—English—	—French—	—Australian—
Edgemoor, lowest, \$114.50	Three lowest, \$283	Three highest, \$149.50	French, \$128.50
Union, \$118	Three next lowest, \$157.50	Three next highest, \$149.50	Australian, \$554

A single feature in the designs as a whole, of merely curious interest, may be noted in passing. Engineering is supposed to be an exact science, and if it is so, there must be abstractly some span or combination of spans which would cover the given total distance, with the given depths of water and foundations, more economically than any other. In that case, as these designers were all skilled men, who knew tolerably well what they were about, we should expect, according to the theory of probabilities, that although no two designs would exactly agree, yet that a majority of them at least would show a tendency to approximate to some particular average span which would be thus clearly indicated as the span or combination of greatest economy.

Nothing of the kind occurs. Between the shortest proposed span of 223 ft., which happens to be in the cheapest design, and the longest of 550 ft., which is palpably too great, and occurs in the next to the dearest (the French) design, the spans proposed range from 223 to 550 ft., by differences of 15, 13, 11, 27, 3, 19, 27, 19, 13, 45, 17 and 118 ft., the average difference which would have made a complete step-ladder of the whole series (excluding the last) being 19 ft.!

We may well believe that the respective merits of the pin-connection system and riveted construction of girders were never so severely brought home to the English and Continental bridge-builders as in this letting, and one cannot but be curious to see what effect it will have in the future. It is inconceivable that the lesson will be lost on English builders, for conservative as they are, and sometimes almost hide-bound, one is tempted to say, in their adherence to precedent, the result of the Hawkesbury bridge competition should appeal to their judgment in a way that abstract argument, and even the contemplation of the magnificent successes of American engineers in the United States, could never do. If the case were reversed, we feel sure that American engineers would not be slow to draw the evident moral, and we shall not regard the case of our English friends as absolutely helpless and beyond missionary effort until we see that even the bitter experience through which they have just passed (likely to be repeated when similar occasion offers) does not lead them to take a few points from their brethren over the seas.

NORTHWESTERN LUMBER PRODUCTION.

The *Northwestern Lumberman*, of Chicago, has for several years collected very complete statistics of the production of pine lumber in the Northwest, including the whole pine territory in the United States from Lake Erie to Minnesota, for each district, and, indeed, usually for each establishment separately—a work of very great difficulty, which seems to have been marvelously well done, this journal having facilities for doing it which do not exist elsewhere, as every weekly issue testifies by the extent and minuteness of the news concerning its specialty which it gathers and presents.

The total production of pine lumber in the Northwest (not including shingles) is given as follows for 13 years, in thousands of feet:

Year.	M. ft.	Year.	M. ft.
1873.....	3,993,790	1880.....	5,651,295
1874.....	3,751,306	1881.....	6,768,857
1875.....	3,908,553	1882.....	7,552,151
1876.....	3,879,046	1883.....	7,624,790
1877.....	3,505,373	1884.....	7,935,033
1878.....	3,629,473	1885.....	7,053,094
1879.....	4,806,943		

Thus the production last year was 11 per cent. less than the year before and the smallest since 1881. Previously there had been an uninterrupted increase since 1877, though it was slight after 1882. This increase had been enormous from 1878 to 1882, amounting to 108 per cent. in the four years and to 33 per cent. in the single year from 1878 to 1879. It was not possible that it should continue at this headlong rate, and the course of production since has been something like that from 1873 to 1878, when it was nearly stationary, declining slightly. The average yearly production for the last four years has been 7,541,000 M. ft., against 3,898,000 for the four years beginning with 1873, so that the rate of production now is nearly double what it was then. The large decrease in production last year was doubtless due to the existence of extraordinarily large stocks of lumber at the mills at the beginning of the year. The provision for manufacturing had been increased after the demand decreased, or ceased to increase, and at the close of 1884 the *Northwestern Lumberman* found no less than 3,516,957 ft. on hand at the mills—44 per cent. of the whole year's production. How much this exceeded the ordinary stock there is no means of knowing, for a complete census of the stocks on hand had never been taken before; but all producers were alarmed by it, and logging operations were reduced in consequence. At the beginning of this year, the stock was 3,237,809 M. ft., a reduction of 279,148 M. ft. This stock was nearly 46 per cent. of the year's production, however.

Examination of the production of the different districts shows that the decrease in production last year was quite general, extending to those districts which had made the greatest gains in recent years as well as to those whose production had been stationary or decreasing. Thus the production, in millions of feet, in the five grand divisions into which the *Lumberman* divides the field have been as follows:

Year.	West of Chicago.	Chicago.	Interior Mich.	Saginaw.	Lake Erie.
1878.....	1,024.0	1,251.1	566.1	788.3	...
1879.....	1,573.2	1,531.5	653.2	1,049.0	...
1880.....	2,072.3	1,801.4	628.7	1,149.0	...
1881.....	2,455.3	2,110.8	906.4	1,296.3	...
1882.....	2,931.9	2,188.4	922.4	1,454.9	54.5
1883.....	3,134.3	2,111.1	883.9	1,439.9	50.6
1884.....	3,448.6	2,236.3	789.0	1,409.8	51.2
1885.....	3,169.0	1,877.2	661.6	1,190.9	52.3

Compared with last year there is a decrease of 8 per cent. in the "West of Chicago District," which includes mills which do not usually ship by way of a lake port, but market their lumber in the west directly by rail—all the Wisconsin mills except those on and near Green Bay and Lake Michigan, and all the Minnesota mills and those on the Mississippi further south, which get their logs from Wisconsin and Minnesota. This district produced 45 per cent. of all the lumber last year, against 43½ last year, so that it gained in comparison with other districts. In 1878 it produced 28 per cent. of the total, and it has made a larger and larger proportion ever since.

The decrease from 1884 to 1885 was 11½ per cent. in the "Chicago District," which includes those mills which market their lumber chiefly by way of Chicago or other Lake Michigan ports—those on both shores of Lake Michigan, Green Bay, and in the Upper Peninsula of Michigan. This district had very little increase in production after 1881, and makes a much smaller proportion of the whole now than formerly. In 1878 it produced 34½ per cent. of the whole; in 1881, 31½ per cent.; in 1884, when the total production was largest, 28.2 per cent.; last year, 28 per cent.

The railroad and interior mills of the Lower Peninsula of Michigan, generally ship their lumber directly from the mills to the places of consumption south, east or southwest; they were a comparatively late development, as it was thought impossible, form-

erly, to produce to advantage except where water afforded the way for bringing the logs to the mills, and marketing the lumber afterwards. As early as 1873, however, the production of these mills was nearly as great as it is now, and then it was 15½ per cent. of the total production; in 1874, 19 per cent.; in 1878, 15.6; in 1884, 10 per cent.; last year 9.4 per cent. The quantity produced at these mills increased 63 per cent. from 1878 to 1882; but it has decreased ever since, while till last year the production increased in the "Chicago" and "West of Chicago" districts. The supply of trees has probably decreased so much as to make it relatively more difficult to get logs there. Then, too, logging railroads are largely depended upon for collecting the logs, and these exhaust the supply near them in a very short time, so that new ones have to be built every year to keep up the supply. People will not go to this expense when there is not a good prospect of a considerable profit on the lumber.

The "Saginaw District" includes the Lake Huron shore as well as the Saginaw Valley—the latter one of the oldest of the lumber districts of the West. In 1873, 15½ per cent. of the total production was in the Valley and 4.3 on the Huron Shore; this quantity then was larger than again until 1879, though the production on the Huron shore increased largely the year before. In 1878 the whole district produced 21.7 per cent. of the whole Northwestern supply, against 19.8 in 1873; the maximum production was reached in 1882; but it was then but 19.3 per cent. of the Northwestern total. The decrease from 1884 to 1885 is 15 per cent., but there was an increase on the Huron Shore, and the decrease in the Saginaw Valley was no less than 25½ per cent., and since 1882, when its production was greatest, 23½ per cent. This whole district markets its lumber very largely in the East and also south of Michigan. The Saginaw Valley lumber now goes very largely through by rail to the East as well as the South; but recently it made the first stage of its journey almost entirely by lake—to Buffalo, Toledo, etc.

The two great facts shown by the statistics is that the proportion of the lumber production distributed from Chicago tends to decrease, and that produced northwest of Chicago to increase. This tendency is greater than the figures for production of the "Chicago District" indicate. Chicago does not receive the whole of the production of this district, and receives some from places in other districts; but its aggregate lumber receipts in successive years compare as follows with the total production and the production of the "Chicago District," the figures being for millions of feet:

	Chicago receipts.	Chicago District.	Total.
1878.....	1,180.6	1,251.1	3,429.5
1879.....	1,469.9	1,531.5	4,806.9
1880.....	1,561.8	1,801.4	5,651.3
1881.....	1,878.9	2,110.8	6,768.9
1882.....	2,117.5	2,188.4	7,552.2
1883.....	1,909.9	2,111.1	7,624.8
1884.....	1,821.3	2,236.3	7,935.0
1885.....	1,731.7	1,877.2	7,053.1
Total.....	13,671.6	15,007.8	51,021.7

On the average the Chicago receipts have been 9 per cent. less than the production of the Chicago district; but for the last three years they have been 13½ per cent. less; but the most important thing is the percentage of the total production received at Chicago, which has been:

1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.
32.5	30.6	27.6	27.8	28.0	25.1	23.0	24.6

Thus the proportion of the total production marketed from Chicago grows smaller, and recently has been very much less than it was some years ago.

It is not easy to see why this should not continue. The newer parts of the country are nearer to the lumber of West Wisconsin and Minnesota than to Chicago; the railroads more and more accept long hauls at low rates, so that even Lake Michigan and Green Bay mills now ship considerable lumber direct to the places of consumption southwest and south; the pine woods which supply Chicago have been worked much longer and must be much more nearly exhausted than those in the "West of Chicago District;" the general tendency of trade is to eliminate intermediate markets and enable the merchandise, especially if bulky, and therefore costly to handle, to go as directly as possible from the producer to the consumer. The supply near the lakes, having been first attacked, will be soonest exhausted, and Chicago receives substantially its whole supply from lake mills, nor is there likely ever to be any really great lumber market which receives by rail, because this would compel an unnecessary transfer. When the home supply is further reduced, there may be large imports from Canada, and these doubtless will move by lake and be distributed from markets intermediate between the producer and the

consumer, like Chicago. Relatively to the total lumber production, however, the Chicago trade is likely to continue to grow less, which is an important matter for the railroads west of Chicago, as they apparently have realized, judging by the connections with the Wisconsin lumber regions which they have been securing of late.

Some facts concerning the lumber production specially effect certain railroads. The production on certain specified lines is given as follows by the *Northwestern Lumberman*:

Railroad.	1890.	1881.	1882.	1883.	1884.	1885.
St. Paul & Omaha.....	197.0	180.5	276.5	288.1	274.1	274.1
Wis. Valley.....	141.9	180.5	236.2	254.6	271.7	215.0
Wis. Cen.....	142.2	182.5	142.2	282.0	302.0	239.2
M. L. S. & W.....	...	...	...	...	90.2	87.6
In Wis.....	284.1	363.0	575.4	813.1	961.0	805.9
Chic. & W. Mich.....	58.4	109.2	206.9	199.6	100.6	103.9
Grand R. & Ind.....	174.8	267.9	329.6	306.4	319.0	240.4
Det., Lan. & N.....	71.5	114.2	102.7	129.7	126.1	116.2
Flint & P. M.....	92.7	130.9	112.6	110.0	107.5	87.0
Mich. Cen., Mack. Div.....	68.3	84.2	72.6	70.3	93.3	100.0
In Mich.....	465.7	706.4	824.4	819.0	742.5	647.5

On all the Wisconsin roads the production was less last year than in 1884, but nearly half of their total decrease was on the Wisconsin Central, which lost 24 per cent., the Wisconsin Valley (Milwaukee & St. Paul) losing 21 per cent., the Milwaukee, Lake Shore & Western (notwithstanding a large increase of mileage in the woods) 11 per cent., and the St. Paul & Omaha only 5 per cent.

The figures for the Michigan roads cover all of the six years for all of the five railroads. In the aggregate the production on them last year was 12½ per cent. less than in 1884 and 21 per cent. less than in 1883. They have not fared alike, however. The West Michigan gained a little over 1884, but had 47 per cent. less than in 1883; the Lansing & Northern had 8 per cent. less than in 1884 and 10½ per cent. less than in 1883, but more than in earlier years; the Flint & Pere Marquette lost 18 per cent., and the Grand Rapids & Indiana 23 per cent., compared with 1884; but more was produced on the Mackinaw Division of the Michigan Central than ever before—only a little more than in 1884, but nearly a third more than in 1883.

The production on the St. Paul & Omaha was greater than on any other railroad last year, but in 1884 it was behind the Wisconsin Central, and the Wisconsin Central was behind the Grand Rapids & Indiana. The latter, which is the oldest of the lumber railroads, still has twice as much produced on it as on any other railroad in Michigan.

It is not possible to say without special study of each case how far a lumber railroad is likely to be affected by the exhaustion of the forests on it. In some forests the soil is so favorable for agriculture that the country is cultivated nearly as fast as it is cleared; but elsewhere, especially where the forests are nearly all pine, when the forests are destroyed the land remains barren and desolate, with very little population or production of any kind. It is a notable fact that the pine regions of Michigan and Wisconsin have had great growth of population within the last fifteen years; and most of what are known as lumber railroads have so far kept up their earnings pretty well. Most of them, however, still have a great deal of lumber to carry and also some country on their lines which never was properly a lumber country.

New York Grain Receipts.

The receipts of grain and flour at New York last March are notable for showing an unprecedentedly large share brought by the Delaware, Lackawanna & Western Railroad, and a considerable quantity by a new competitor, the Lehigh Valley, which until last February never brought any quantity worth mentioning. The Lackawanna brought more than any other railroad except the New York Central, and but a fourth less than that road, and nearly twice as much as it ever carried before in any one month, and as much as in the last nine months of last year. There can be no doubt that these extraordinary shipments were due to some irregularity somewhere, as was supposed at the time. There has been no apprehension on account of it, however. The Lackawanna is a party to the trunk line pool on east-bound freight, and it will not on the average get a larger share than is allotted to it in that pool.

The case of the Lehigh Valley is different. It has running rights over the Erie to Buffalo, and has had for many years, and has sometimes taken enough freight from New York to be felt, but never before, we believe, any large amount of east-bound freight. It would seem to be to its advantage to cultivate east-bound freight, however; because it ships a good deal of coal to Buffalo, and needs something for back loads. The Produce Exchange reports do not distinguish the Lehigh Valley receipts of grain, which are given under

"other roads;" but the other roads scarcely ever bring more than 80,000 to 100,000 bushels, and the 476,095 bushels credited to them in March, as well as the 383,000 in February, must, four-fifths of it, have come by the Lehigh Valley, which will probably have to be reckoned with hereafter as a New York grain carrier, whenever rates are high enough to make grain-carrying profitable.

The total amount of grain and flour brought to New York last March was larger than in the corresponding month of any previous year except 1885 and 1880, though nearly the same as in 1879 and 1883, having been, in bushels:

Year.	Bushels.	Year.	Bushels.
1879.....	16,116,924	1883.....	10,226,564
1880.....	10,925,070	1884.....	6,278,880
1881.....	9,812,220	1885.....	12,290,022
1882.....	5,063,330	1886.....	10,256,150

Considering that the rate for the previous two years was 15 cents per 100 lbs. from Chicago to New York, the largeness of the shipments this year is remarkable, even when we assume, as we should, that most of the Lackawanna and Lehigh Valley shipments were taken at less than the regular 25-cent rate. The reduction probably was not large, because it was not necessary to secure shipments when other lines generally were maintaining rates.

The large receipts at New York are further evidence that trunk line business cannot be judged by the Chicago shipments, for the Chicago grain shipments last March were among the lightest on record. The New York grain receipts may come, and in March are likely to come, partly from the Buffalo elevators; but there was this year a much larger movement over Western railroads than the Chicago shipments would indicate.

For the three months ending with March the New York grain receipts were larger this year than in any other except 1879, 1883 and 1885, having been:

Year.	Bushels.	Year.	Bushels.
1879.....	26,389,564	1883.....	26,335,912
1880.....	21,811,679	1884.....	16,630,579
1881.....	21,957,940	1885.....	28,185,214
1882.....	17,646,949	1886.....	24,702,903

This shows that the trunk lines have had actually a heavy grain business this year. It has yielded a considerable profit, while there was very little in the two years previous, or in 1879, and none in 1882. But it has not been a very large business for the old roads; for if we exclude the receipts by the West Shore, the Lackawanna and the Lehigh Valley, those of the old roads have been:

1883.	1884.	1885.	1886.
25,065,018	14,750,160	22,757,709	18,304,880

and the amounts given as the totals for previous years. Thus, they carried this year a quarter less than in 1883, when rates were the same, and very little more than in 1882, when the traffic was thought to be miserable; while the quantity carried by them in 1880 and 1881, with a 35 instead of a 25-cent rate, was a fifth more than this year.

The Cincinnati, Hamilton & Dayton Railroad has passed under the control of the Chesapeake & Ohio interest, and it is supposed that so far as possible it will be used to direct traffic to Newport News. This can be possible only to a very moderate extent, however, for this is, chiefly, a north-and-south road; and reaches no great grain market. From most places on the line Newport News is more distant than other and greater seaports, and for most traffic originating on the line Newport News is not a market. When the Chesapeake & Ohio carries such freight as provisions from St. Louis via Cincinnati (from which places it is a short line to the seaboard), it is usually compelled to carry it through Newport News to New York or Boston for a market or export. Now, for traffic originating at a considerable distance north of the Ohio River, as at Toledo, Indianapolis or Chicago, to take this route is very wasteful. It first goes three or four hundred miles south, and then, after having been moved east, goes nearly an equal distance north again. There is not such a profit on through freights as to leave any margin after paying for an extra haul of some hundreds of miles. The Cincinnati terminus of this road may be of considerable value to the Chesapeake & Ohio system, however. It must be remembered that this system includes a line from Cincinnati to New Orleans, as well as one from Cincinnati to Newport News, and of these the former may well be the more important to Cincinnati.

The shipments of dressed meat from Chicago in March have a special interest, because the new rates on live stock and dressed beef applied to the shipments of that month. The shipments of live cattle and dressed meat reported were, in tons:

1886.	1885.	Inc. or dec.	P. c.
Live cattle.....	25,050	31,939	+ 6.854
Dressed meat.....	20,001	14,009	+ 5.972

The report this year, however, is incomplete, be-

cause the shipments by the Chicago & Atlantic are not included, while they were included last year. This would not make any difference if it carried both cattle and dressed meat in proportions like the average of all the roads. Actually, however, it carries a good many cattle and no dressed meat. Its share of the cattle was about 10 per cent. in January and February, and at that rate the total cattle shipments in March were 27,861 tons, the dressed beef shipments remaining 20,001, and compared with last year there is a decrease of 4,078 tons (12½ per cent.) in cattle and an increase of 5,972 tons (42½ per cent.) in dressed meat, the latter yielding a much larger amount of meat than the cattle shipped.

This, however, exaggerates the proportion of cattle going east over the Chicago railroads; for with live stock are counted all the cattle taken from the Chicago stockyards a few miles to Hammond, on the Indiana line, and there slaughtered and forwarded in refrigerator cars—a very considerable quantity. Allowing for everything, it would appear that last March as much at least as four pounds of meat went from Chicago in carcasses to every three pounds of beef in live cattle.

The shipments of freight from New York to the West have fallen off somewhat since March. They averaged 3,882 tons per day in March, while for the three weeks ending April 17 the average was 3,097 tons, or 8½ per cent. less. There is usually some decrease from March to April, but the April shipments so far reported are below those of the two years previous, the daily average in April having been:

1880.	1881.	1882.	1883.	1884.	1885.	1886.
2,817	3,302	5,383	2,867	3,621	3,401	3,007

Thus the average this year (which returns for the last two weeks of the month may change somewhat) is 11½ per cent. less than last year and 14½ per cent. less than in 1884, but more than in 1880 and 1883. Last year the rates were about 30 per cent. lower than this year, but this apparently had but little effect, for the shipments in each of the first four months of the year were less in 1885 than in 1884, and with the restored rates this year they were but little less down to the end of March than in 1885—270,941 tons, against 278,575.

Pennsylvania Railroad Earnings in March.

The Pennsylvania Railroad again in March showed an increase in earnings, which though much less than in March, is greater than in January.

For 14 successive years the earnings and expenses of the lines east of Pittsburgh and Erie in March have been:

Year.	Gross Earnings.	Expenses.	Net Earnings.
1873.....	\$2,369,678	\$936,223	\$1,433,455
1874.....	2,961,575	2,000,021	961,554
1875.....	2,628,411	1,691,616	936,795
1876.....	2,683,897	2,033,222	650,675
1877.....	2,410,804	1,517,168	893,636
1878.....	2,499,286	1,531,448	967,838
1879.....	2,603,067	1,615,844	987,223
1880.....	3,278,186	1,766,938	1,511,248
1881.....	3,844,304	2,045,078	1,799,226
1882.....	3,912,293	2,496,401	1,415,892
1883.....	4,189,380	2,733,981	1,455,399
1884.....	4,002,627	2,508,076	1,494,551
1885.....	3,635,374	2,474,265	1,161,109
1886.....	3,901,855	2,596,075	1,305,780

Thus the gross earnings this year were larger than last year, but less than in any of the three years next previous; the expenses were exceeded only in 1883 and 1884; and the net earnings, though larger than last year, were smaller than in any of the five years from 1880 to 1884. Compared with last year the gains are:

Amount.	Gross earnings.	Expenses.	Net earnings.
Per cent.....	366.481	121.810	144.671
	7.3	4.9	12.4

This is an important gain in net earnings, though it leaves them less than before last year.

Meanwhile the surplus over or deficiency in meeting all liabilities of the lines west of Pittsburgh and Erie has been:

1879.....	Surplus \$23,552	1883.....	Surplus \$153,366
1880.....	615,059	1884.....	96,033
1881.....	374,421	1885.....	84,208
1882.....	45,163	1886.....	26,766

Thus this western system also shows an improvement, though a slight one, over last year or the year before, but a decline from previous years, very important for some of them. Thus the system which netted the small loss of \$26,769 this year yielded the great profit of \$374,421 in 1881 and the immense one of \$615,059 in 1880, March being the most profitable month of that most profitable year, there being then an altogether unprecedented movement of freight from the West at rates yielding a large profit. The profit on these lines in that month was equal to about ½ per cent. on the Pennsylvania stock then outstanding.

Adding the surplus of this system to and subtracting its deficit from the net earnings of the eastern system, we have as the company's profits from both systems:

Year.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
	\$1,010,775	2,126,308	2,173,647	1,600,965	1,608,793	1,310,518	1,076,901

The amount this year is nearly a fifth more than last year and nearly as great as in 1884, but it is a fifth less than in 1883, 41 per cent. less than in 1881, and 40 per cent. less than in 1880.

For the three months ending with March the earnings

expenses of the lines east of Pittsburgh and Erie have been for ten years:

Year.	Gross earnings.	Expenses.	Net earnings.
1877.....	\$6,090,070	\$4,635,058	\$1,455,012
1878.....	7,085,492	4,467,754	2,617,738
1879.....	7,684,532	4,504,991	3,179,541
1880.....	9,306,314	5,196,786	4,109,528
1881.....	10,129,134	5,965,143	4,163,991
1882.....	10,592,366	7,022,877	3,569,489
1883.....	11,830,953	7,576,975	4,253,978
1884.....	11,003,584	7,308,529	3,695,055
1885.....	9,988,587	7,006,625	2,981,962
1886.....	10,872,857	7,348,142	3,524,715

The gross earnings this year were less than in 1883 and 1884, but more than in any other year. The working expenses were exceeded only in 1883; the net earnings were less than in any of the five years from 1880 to 1884, but more than in the other years. Compared with last year the increases are:

Amount.	Gross earnings.	Expenses.	Net earnings.
Per cent.....	\$884,270	\$341,517	\$542,753
	8.9	4.9	18.2

This gain in net earnings is very large, but, as we have seen, not enough to make good the decrease from 1884 to 1885. Most of this gain in net earnings was made in February, there having been a decrease of \$39,033 in January, an increase of \$437,115 in February, and an increase of \$144,071 in March.

The surplus or deficit of the lines west of Pittsburgh and Erie during the three months ending with March has been:

1879.....	Surplus \$149,449	1883.....	Surplus \$276,640
1880.....	1,049,129	1884.....	Deficit 352,310
1881.....	920,650	1885.....	332,195
1882.....	12,286	1886.....	258,423

There is a slight improvement this year over the two years previous, but a large decline compared with other years, amounting to \$535,063 compared with 1883, which is at the rate of more than 2 per cent. a year on the stock now outstanding, and to \$1,307,552 compared with 1880, which is at the rate of nearly 8 per cent. on the stock then outstanding—so great differences are caused by fluctuations in the profits of this western system of leased and controlled roads.

Combining the surplus or deficit of the western system with the net earnings of the eastern system, we have as the income from both:

1879.....	\$3,328,990	1883.....	\$4,530,618
1880.....	5,158,657	1884.....	3,342,745
1881.....	6,084,641	1885.....	2,649,767
1882.....	3,557,203	1886.....	3,266,292

The gain of \$615,525 over last year is very important and at the rate of about 2½ per cent. per year on the stock outstanding; but the profit is less than in any other year of the eight, and the decreases from three of the years are enormous, as follows:

From 1880.	From 1881.	From 1883.
\$1,892,365	\$1,818,349	\$1,273,336

The decrease since 1883 is at the rate of more than 5 per cent. a year on the stock now outstanding; since 1880, at the rate of 11 per cent. a year on the stock then outstanding. There has been a considerable increase in the property meanwhile, but not in the fixed charges.

It appears, therefore, that this railroad company, though doing much better than last year, is still far below the level of prosperous years. It has nearly, though not quite, made up for the exceptionally large losses of last year.

Grain Shipments and the Opening of Navigation.

The Northwestern grain shipments last week, the week of the opening of lake navigation, were the largest ever made in a single week, an incomplete report giving them as 9,180,054 bushels, seven-eighths of which, probably, went by lake from Chicago and Milwaukee. The weeks of largest shipments heretofore, including all when the shipments were more than 7,000,000 bushels, have been:

Week to	Bushels.	Week to	Bushels.
Oct. 15, 1879.....	7,240,224	April 30, 1883.....	7,015,225
April 12, 1880.....	7,730,317	May 7, ".....	7,573,274
June 7, ".....	7,289,142	Sept. 8, ".....	7,538,279
" 21, ".....	7,539,449	" 15, ".....	7,228,784
Oct. 16, ".....	7,416,234	May 6, 1885.....	8,370,376
June 25, ".....	7,456,759	" 30, ".....	7,283,413

The shipments of the opening week in 1883 may have exceeded those of this year, but then the day of opening was in such a part of the week that part of the fleet which had wintered at Chicago and Milwaukee cleared during the latter part of the week to April 30 and part during the first part of the following week. This year the first vessels cleared Saturday night and Sunday. The first steamers got through the Straits Wednesday night, and when the news was telegraphed the rest of the fleet cleared, so that virtually the whole fleet in Lake Michigan ports cleared during the seven days ending with last Saturday.

The shipments given here are by all routes, rail and river as well as lake. For this year they have not been reported separately by routes yet, but doubtless they were much less by rail than in the spring weeks of most other recent years. The shipments by rail, river and lake in the opening weeks have been:

Week to:	By rail.	By river.	By lake.	Total.
May 5, 1879.....	2,931,802	.....	1,627,278	4,559,080
" 12, ".....	1,684,849	.....	2,610,459	4,295,308
April 12, 1880.....	1,678,293	.....	6,052,022	7,730,317
May 2, 1881.....	1,508,111	.....	3,471,729	4,979,840
April 10, 1882.....	1,394,952	29,564	1,486,978	2,911,494
" 30, 1883.....	2,790,304	287,111	3,957,810	7,015,225
May 7, 1883.....	2,404,300	409,108	4,759,866	7,573,274
" 3, 1884.....	2,640,151	233,410	3,217,296	6,290,857
" 9, 1885.....	2,414,422	115,461	5,840,493	8,370,376

River shipments are included with lake shipments before 1882. They were insignificant until 1881.

The reported shipments of 9,180,000 bushels last week may be changed somewhat by the complete reports, but they cannot fail to be immensely greater than for a long time previous. The total shipments in the previous week were 2,015,679 bushels, and for the five weeks previous only 8,499,000 bushels. The movement of so much in a single week shows that the immense accumulations in the Northwest can be brought to market in a very short time. Nor are these ac-

cumulations entirely without precedent. The day before the first vessels sailed the stocks in store or afloat at western lake ports were 28,067,146 bushels of wheat, 5,826,065 of corn and only a trifle of other grains. The shipments last week were three-eighths of this quantity, and the reported corn shipments were 4,888,000 bushels, or five-sixths of the stock at lake ports. The shipments were not from those ports exclusively, however.

The lake shipments cannot be kept up at this rate, however. The fleet wintering at Lake Michigan ports was an unusually large one, and the vessels wintering below and bound up are not only fewer in number, but they did not begin to arrive until this week, and will hardly be able to discharge and take on cargo so as to clear until the end of this week. There are a few vessels at Duluth which probably cleared by the first of this week, as it was expected that the Ste. Marie, connecting Lakes Superior and Huron, where the ice lasts longest, would be open by the time they could arrive. Duluth has a great deal of wheat to ship; but allowing for everything, and that all the stocks at lake ports will go by lake, the vessels will be able to dispose of them all by June or shortly after, and must depend upon receipts from the interior for employment later. These receipts at this time are extremely light, and the farmers are so occupied at this season that they will probably continue to be light for some time; but there is a great deal of corn on the farms and very little at the markets where it is consumed, and a very heavy movement of that grain is not impossible a little later.

Provision Exports.

The report of provision exports last March compared with those of the previous year shows a large increase (12.7 per cent.) in the exports of pork products, with but a trifling increase in value, a large decrease in quantity and value in salt beef and tallow, and considerable decrease in butter and a large increase in cheese, resulting in the aggregate in a decrease of 8 per cent. in the value of the aggregate exports of beef, pork and dairy products. This value has been, for beef, pork and dairy products in March and the three months ending with March, and for beef and pork products (excluding dairy products) for the five months ending with March, as follows:

	March.	Jan. 1 to March 31.	Nov. 1 to March 31.
1886.....	\$5,826,645	\$19,136,777	\$31,661,164
1885.....	6,359,052	25,760,579	41,186,331
1884.....	5,610,905	21,657,582	38,421,000
1883.....	10,434,325	31,205,190	48,046,910
1882.....	7,093,320	30,440,290	48,103,255
1881.....	8,199,183	52,470,972	73,423,552

It was thus slightly greater in March this year than in 1884, but smaller than in any other, and 44 per cent. less than in 1883, when it was greatest. For the three months the value was much less than in any other, a fourth less than last year, a third less than in 1882 and 1883, and 63 per cent. less than in 1881, the decrease since then being \$33,334,000. The larger part of the decrease in quantity and value has been in pork products, but the impression which seems to prevail that we have greatly increased our exports of beef, tallow, butter and cheese, as a consequence of the very great extension of cattle ranches on the plains west of the Missouri, is not supported by these figures, for the values of these exports, apart from those of pork products, have been for the three months:

	1881.	1882.	1883.	1884.	1885.	1886.
\$10,036,248	\$6,345,954	\$7,763,218	\$7,447,583	\$7,197,350	\$5,151,833	

Thus the beef and dairy produce exported has been materially less in value this year than in any other of the six, and worth not half as much as in 1881.

The last column above, for the first five months of the "packing year," does not include dairy produce. It shows a very great decline, so that the exports this year have been \$9,525,000 (23 per cent.) less than last year, \$16,388,000 (34 per cent.) less than in 1883 and 1882, and \$41,764,000 (57 per cent.) less than in 1881.

Pork products make up the larger part of the total provision exports, and they reached an enormous amount in the four years from 1878 to 1881, which seemed more likely to grow greater than smaller. The failure of the corn crop, diminishing the yield from 1,717 million bushels in 1880 to 1,194 in 1881, naturally gave a great check to these exports, which two more poor crops continued, but when the crop of 1884 reached 1,795 millions it was reasonably expected that the exports would increase again, and if the increase from 635 million pounds in 1884 (from the corn crop of 1883) to 796 millions in 1885 was hardly as great as the corn crop warranted, this was easily explainable by the reduction of the stock of hogs by three successive light corn crops. But when the large crop of 1,795 millions of bushels of corn in 1884 was succeeded by the larger one of 1,936 millions last year, then everything seemed favorable for large production and exports of pork this year, for there had been time enough to increase the stock of hogs. So far, the result has been very disappointing. The exports of pork products in March, for the three months ending with March and for the five months ending with March, and their value, have been, in millions of pounds and in dollars:

	March.		Three months.		Five months.	
	Million	Value.	Million	Value.	Million	Value.
1886	63.5	\$4,098,009	203.2	\$13,984,894	353.8	\$24,953,093
1885	50.1	4,670,344	223.7	15,563,170	373.9	31,708,451
1884	52.7	3,403,145	143.6	14,209,990	298.4	28,365,088
1883	65.3	7,163,643	218.1	25,441,972	350.4	38,517,936
1882	57.4	6,038,580	233.8	24,004,336	414.6	41,392,625
1881	130.0	5,993,383	414.6	41,834,724	742.5	63,643,456

In years previous to 1881 the exports of pork products had been, in millions of pounds :

	1877.	1878.	1879.	1880.
March	63.9	132.4	124.6	157.5
Jan. 1 to March 31	219.6	396.2	382.9	531.8
Nov. 1 to March 31	385.9	540.5	615.2	437.5

In years previous to 1881 the exports of pork products had been, in millions of pounds:

	1877.	1878.	1879.	1880.
March.....	69.9	132.4	124.6	137.5
Jan. 1 to March 31.....	219.6	396.2	380.2	329.9
Nov. 1 to March 31.....	385.9	540.5	615.2	541.8

Thus we find that the March exports of pork products, though this year 12.7 per cent. more than last year, nearly twice as great as in 1884, about the same as in 1883, and more than in 1882, were but half as great as in any of the four years from 1878 to 1881, and less even than in 1877, when the bad times after 1873 were at their worst. The value of these exports was a trifle more than last year, but was only one-fifth more than in 1884, when the quantity was but half as great, and 43 per cent. less than in 1883, when the quantity was nearly the same.

For the three months the quantity this year was 9 percent, less and the value 24½ per cent. less, and for the five months the quantity was 5½ per cent. less than last year, in spite of the much larger crop of corn, and only 18 per cent. more than in 1884, after three successive bad crops of corn, and 11 per cent. less than in 1882, after the worst crop of corn the country has known for many years. The exports were not half as great as in 1881, 35 per cent. less than in 1880 and 1878, and 42 per cent. less than in 1879. The value of the pork products for the five months is smaller than in any other year recorded—the smallest since 1876, doubtless—and the decrease of \$16,350,000 (40 per cent.) since 1882, and of \$38,690,000 (61 per cent.) since 1881, is large enough to be important even to a country as great as this.

This disappointing result is probably due to the want of prosperity among European workmen, though to some extent the duties and other obstacles in the way of their obtaining our pork and bacon have doubtless reduced their imports. But our immense exports from 1878 to 1881 were at a time when industries were growing better in Europe, and workmen could add to their scanty expenditures for meat. An additional meal or two a week by all European workmen's families makes an enormous increase in the demand. Certain it is that, whether we could have spared as much as in 1881 or not, it was not wanted so much as then, for the average price of all pork products has been for the five months in different years, in cents per pound:

	1881.	1882.	1883.	1884.	1885.	1886.
8.57	10.34	10.99	9.51	8.48	7.05	

Thus while selling our bacon and lard for nearly 18 per cent. less per pound than in 1881, we have been able to dispose of abroad less than half as much.

One thing we have done pretty thoroughly—that is, we have established one of the principle conditions of industrial activity in Europe, which is cheap food. Bread and meat were never before so cheap.

In the description of the New York, West Shore & Buffalo standard stations in our number for last week (page 275), it was stated that all the stations on the road were designed by Wilson Brothers & Co., a single word having been unintentionally omitted. All the standard stations on the road were designed by Wilson Brothers & Co., as stated, but the special stations, at points where, for various reasons, the standard designs were not or could not be used, were designed by Mr. H. C. Blanchard, who was acting as Architect for the road under Chief Engineer Walter Katte.

The date of the coming convention of the American Society of Civil Engineers, at Denver, Col., has been definitely fixed for July 1, 2 and 3. The arrangements now in progress contemplate securing a special train of sleeping and private cars, which will leave New York Saturday morning, June 26, stop over Sunday in Chicago or St. Louis, and arrive in Denver on Tuesday, June 30. After the convention an excursion will be made on Saturday, July 4, to Georgetown and return, over the Georgetown, Breckenridge & Leadville Railway, on which occurs the only bridge spiral in the world, illustrated in the *Railroad Gazette* of Nov. 27, 1885. Sunday will be passed in Denver. On Monday a trip will be made to Greeley, returning by another route, so as to afford a good view of the region where such remarkable results have been attained by irrigation. Tuesday an excursion will be made to Leadville, spending the afternoon and night in that city. The following day, July 8, the trip will be continued to Gunnison and Colorado Springs, passing over the more remarkable features of Colorado railroading. The special train will then return to New York, but arrangements will probably be made for the convenience of those desiring to extend their trip to Salt Lake City or other points of interest. It is proposed to secure some of the new Monarch sleeping cars for the trip, and to bring the total expense within a very moderate sum, so that a large attendance is expected.

The Chicago through rail shipments eastward of flour, grain and provisions reported for the week to April 24 (excluding those by the Chicago & Atlantic) have been, in tons:

	1882.	1883.	1884.	1885.	1886.
Flour.....	3,060	4,359	9,981	18,420	3,825
Grain.....	14,399	19,423	38,158	29,933	5,563
Provisions.....	4,898	5,951	4,906	6,824	7,555
Total.....	22,357	29,733	53,045	55,177	16,883

By Chi. & Atlan. not open. not open. 14,584 5,138

These figures are all from the incomplete weekly reports. Those for last week were, allowing for the Chicago & Atlantic, nearly as small as any ever reported, but the provision shipments, it will be noticed, were larger than in previous years, and the great decrease is in grain.

For the last seven weeks the shipments have been:

	Mar. 13.	Mar. 20.	Mar. 27.	Apr. 3.	Apr. 10.	Apr. 17.
Flour.....	5,684	4,985	5,650	5,221	5,083	4,327
Grain.....	19,686	14,757	16,502	11,460	7,843	7,280
Provisions.....	7,262	6,173	5,800	6,151	6,011	7,697
Total.....	32,637	25,915	27,952	22,910	18,937	19,304

The decrease last week from the previous week is no greater than the blockade of the Lake Shore by the strikers might be expected to cause, but the shipments were very small the previous week. The grain shipments make an insignificant

appearance by the side of the lake shipments in the same week, which amounted to more than 6,000,000 bushels from Chicago, which is about 175,000 tons. This is of itself evidence that rail rates have been well maintained. The provision shipments have not decreased, but were larger last week than in any other of the seven, and the decrease in flour shipments has not been great. Of the total decrease of 15,754 tons from the second week of March, when they were greatest, 14,183 tons were grain.

St. Louis in the week to April 17 received nearly as much corn as Chicago and 36 per cent. of the total Northwestern receipts, which is a larger proportion than usual. Its percentage of the total Northwestern grain receipts has been in each of the last eight weeks:

	Feb. 27.	Mar. 6.	Mar. 13.	Mar. 20.	Mar. 27.	Apr. 3.	Apr. 10.	Apr. 17.
21.1	29.8	18.7	14.2	10.0	12.9	21.3	20.9	

The proportions in the last two weeks are nearly equal to the average at this season. Its percentages of the total in March and April of previous years have been:

	1880.	1881.	1882.	1883.	1884.	1885.
March.....	23.2	28.7	21.3	24.3	28.2	19.9
April.....	24.3	28.2	19.7	15.5	20.8	21.3

As the Northwestern receipts were everywhere and in the aggregate small this year, the amount of grain business lost by the interruptions to railroad traffic has not been very great. This business, however, is not relatively as important at St. Louis as at Chicago and some other places.

Duluth continues to have large wheat receipts (for the season), though heretofore its receipts have been confined almost entirely to the fall months, beginning about Sept. 1 and ending when navigation closed. For the three weeks ending April 17 more than half the total receipts of the eight reporting Northwestern markets were at Duluth (969,702 bushels out of 1,864,436), which received twice as much as Chicago and Milwaukee together, the other two shipping markets for spring wheat. It is true that the total is small; but it is a remarkable fact that so much should go to a lake port which until last year made very small spring and summer shipments. The quantity in store there when navigation opened two years ago was less than a million bushels; last year it was 6,438,000 and this year 7,242,000 bushels.

Lake rates fell rapidly after the opening. Indeed, the last vessel had not left before room on vessels to arrive was offered at 3½ cents a bushel for wheat, which is half a cent less than the prevailing rate for some two weeks previous. Wednesday it is reported that vessels were offered at 2½ cents, without takers. Canal rates have kept up, however, as was to be expected, as the canal does not open till Saturday, and the Lake Michigan fleet has arrived at Buffalo early in the week.

The railroads northwest of Chicago last week made an informal agreement, in accordance with which the 8 and 10 cent rates from Chicago to St. Paul and Minneapolis came to an end, and on Friday rates ranging from 10 to 50 cents went into effect—less than ordinary rates, but a great improvement over 8 and 10 cents. The making of an association, or other arrangement, for maintaining rates was left for future negotiations.

The Pacific Coast Association, which covers the Pacific Coast traffic of the eastern connections of the Pacific railroads, between the Missouri River on the west and St. Louis and Chicago on the east, reports that the tons carried and the revenue from it in 1885 were:

	Tons.	R-revenue.
East-bound.....	57,131	\$311,022
West-bound.....	147,035	609,021
Total.....	234,166	\$920,043

Thus west-bound freight furnished 62½ per cent. of the tonnage and 66½ per cent. of the earnings, the average per ton being \$4.14 on west-bound and \$3.57 on east-bound freight.

The total earnings from this traffic in 1885 were about \$200,000 (21½ per cent.) less than in 1883. The lines connecting with the Union Pacific carried 46 per cent. of the west-bound traffic and had 48½ per cent. of the west-bound earnings; the lines to Atchison and Kansas City carried 26 per cent.

Record of New Railroad Construction.

Information of the laying of track on new railroad lines is given in the current number of the *Railroad Gazette* as follows:

Chicago, Burlington & Northern.—This company reports an addition of 17½ miles at various points.

Dublin & Wrightsville.—Extended from Bruton, Ga., southwest to the Oconee River, 7½ miles.

Long Beach.—Track laid from Mannabawkin, N. J., to Barnegat Bay, 5 miles.

San Antonio & Aransas Pass.—Extended southwest to Beeville, Tex., 20 miles.

South Pacific Coast.—A branch is completed from Campbell, Cal., east to New Almaden, 9 miles.

This is a total of 68 miles on 5 lines, making in all 577 miles thus far reported for the current year. The new track reported to the corresponding date for 15 years has been:

	Miles.	Miles.	Miles.
1886.....	577	1881.....	906
1885.....	308	1880.....	1,096
1884.....	595	1879.....	1,006
1883.....	1,071	1878.....	391
1882.....	2,283	1877.....	267
		1876.....	187
		1875.....	1,070

These figures include main track only, second or other additional tracks and sidings not being counted.

NEW PUBLICATIONS.

Something about Niagara. Issued by the Passenger Department of the Michigan Central Railroad.

This little book contains the description of Niagara Falls written by the late Anthony Trollope, now reproduced with some very neat illustrations. To this is added a description of the cantilever bridge over the Niagara River and an account of its construction, making an interesting little volume for the tourist.

The Coal Trade. By F. E. Seward. Issued by the *Coal Trade Journal*, New York.

This is the thirteenth annual volume of this manual of the statistics of the coal trade in the United States. It continues the many useful features of the preceding volumes, with several additions, and is indispensable to all who are interested in the trade. It is the only yearly publication of the kind, and contains much valuable information not easily accessible elsewhere.

Facts and Figures about Michigan. Issued by the Passenger Department of the Michigan Central Railroad.

This is a very convenient little hand-book, giving in a condensed form a great deal of information, statistical and historical, about the state of Michigan. Besides the usual statements, it gives a list of all the railroads in the state, with their officers and all the stations on each line, and it also gives a list of all the newspapers and periodicals published in the state. It has been compiled with judgment and contains in compact form much information which has usually to be hunted up when wanted at a considerable expense of time and trouble.

Transactions of the Technical Society of the Pacific Coast, 1884-5.

The multiplication of local engineering societies has gone on very fast of late years, and one of the latest and most vigorous is that above named, which was organized in April, 1884, with a membership of 126, about half of whom were civil engineers, and nearly all the remainder mining or mechanical engineers, with a few architects, chemists, metallurgists, surveyors and patent attorneys.

As a result of less than two years' work, we have before us a bundle of *Transactions* of some 530 pages of an unusually high average character. Some of these papers are exceedingly valuable and careful discussions of important engineering questions. Among those which have more particular reference to railroad work we may mention a paper on Cable Railway Propulsion, on Sediment-Carrying Mountain Streams (which might be studied to much advantage by constructing engineers), on Shrinkage of Earthwork, Dynamite Catastrophes, Railroads Across the Alps, on the Slide Rule and on the Aneroid Barometer. There are, besides these, many papers on hydraulic, mining and sanitary engineering questions, including some of the most valuable. A very interesting paper is that on the Destruction of the English Dam, in which the breaking way of a dam 79 ft. high discharged 600,000,000 cubic feet of water through a narrow gorge in an hour and a half, being the second largest catastrophe of the kind on record. For the first 40 miles the flood wave reached a height of from 40 to 80 ft., and it was observed by those who saw the rush in the narrower gorges that the face of the torrent was a mass of timber and trees, no water being visible. The most curious point is, however, that although this tremendous rush of water descended 5,850 ft. in 43 miles, or 133 ft. per mile, it was 6½ hours in covering that distance, giving a maximum velocity of only 10.4 miles per hour, or 15 ft. per second. For the first 85 miles the velocity was 6.66 miles per hour, the last half of the distance having hardly one-tenth the fall.

The society is doing capital work, but in examining such publications, and the many valuable papers which appear in them, one cannot but be struck with the disadvantage under which they all labor in the very limited circulation which their papers attain. There are too many independent organizations publishing papers which appeal to the same class of readers, but only reach a small fraction of those who would naturally be interested in them. The preparation of such papers is this discouraged, and the professional advantage of being connected with any one of the societies, even the largest of them, curtailed. If it should prove possible to devise a plan by which, without introducing any disorganizing tendencies, these now entirely distinct organizations of engineers, which now number some dozen or fifteen, can become simply parts of one great whole, it can hardly be doubted that it will result greatly to the advantage of all. A committee of the American Society of Civil Engineers is laboring with this question, and find it a pretty knotty one, but it is to be hoped they may report some plan which will accomplish the end in part, at least.

TRADE CATALOGUES.

Illustrated Catalogue of the Rand Drill Company, New York.

The new edition of this catalogue is full of valuable information and tables on the use of rock drills and air-compressing machinery, repeated in substance, with some additions, from the former catalogue, which we noticed about a year ago. A notable further addition to this catalogue, however, is a series of views of a dozen or more engineering works on which the machinery and explosives of this company have been used, the greatest of which is the Flood Rock works and explosion. Most of these are reproductions from photographs by what is known as the "direct process," and they are generally very creditable and life-like reproductions of photographic effects. The war as to what drills are doing the best work on the new Aqueduct tunnel is waged with

some vigor, enough at least to make it clear that each side has its partisans. The new freezing process for shaft sinking through quicksand is likewise illustrated.

Foreign Railroad Notes.

At a recent special meeting of the London & Northwestern Railway Company to protest against the new "Railway Rates and Charges Bill," the chairman said that the company had twenty millions of rates.

A collision took place on the Arlberg Railroad, in Austria, Dec. 8, caused by the engineer of a freight being attacked by paralysis as he was approaching a station where he was to cross a passenger train. The fireman seems to have remained unconscious of the condition of the engineer until his attention was forcibly drawn to it by the passage of the train through the station and out upon the single track beyond, upon which a passenger train was at that moment approaching.

Longitudinal passages in cars seem to be on the increase in Germany. Except for the third class, the favorite method is to put them to one side, with compartments opening off them. In this arrangement a water closet is usually provided at one end in the first and second-class cars. The last cars of this sort, illustrated in the *Organ*, have the end platforms inclosed, with doors at the corners, and the guard's seat, commanding a view of the train, accessible from the inclosed end platform, without having to go outside, very much as in our freight cabooses.

The six English railroad companies which have steamboat lines across the channel, connecting their roads with the continent, received in the aggregate for the steamboat traffic:

	1885.	1884.	Inc. or Dec.	P. c.
Earnings....	\$3,630,000	\$3,480,000	+\$150,000	5.4
Expenses.....	3,060,000	2,910,000	+ 150,000	5.2
Net earnings..	\$540,000	\$570,000	— \$30,000	5.3
P. c. of expenses.	85.00	83.82	.....	.....

The number of passengers crossing the channel in successive years has been:

	1877.	1882.	1883.	1884.	1885.
	360,687	490,189	489,672	419,510	431,972

Thus the number last year, though 3 per cent. more than the year before, was 11½ per cent. less than in 1883 or 1882. From 44 to 49½ per cent. of all the passengers cross by way of Calais, from 22 to 29 by Boulogne, from 15¼ to 17½ by Dieppe and from 10¼ to 16 by Antwerp, etc.

At a meeting of what is equivalent to our "time-table convention" of the railroads of Central Europe this spring, on motion of the Gotthard Railroad a uniform method of distinguishing between night and day in printing time-tables was agreed upon. This is to underline the figures for minutes from 6.00 p. m. to 5.59 a. m., thus 6.00 means 6 p. m. 12.00 midnight; 6.00, 6 a. m., etc. In all cases the figure for minutes are printed above the level of the figures for hours, and always two figures for minutes; thus 12.03, not 12:3, for three minutes past noon. This method has been generally used in Germany for some time, but elsewhere, and there until recently, there has been great diversity; in some cases inclined or Italic figures being used for night minutes, in some cases Roman figures, as 7 ix for 9 minutes past 7 p. m., often by giving the initials for forenoon and afternoon, varying with the languages, etc. Here the *Official Guide* prints all afternoon figures in full-face type—not indicating night and day, but a. m. and p. m. This will do until we have the 24 o'clock system.

THE SCRAP HEAP.

A Tough Calf.

A dispatch to the *Atlanta Constitution* from Mableton, Ga., says: "Rather a peculiar accident happened to a small yearling this morning. No. 24 East Tennessee freight, west-bound, struck it, or rather lifted it up on the pilot, when it must have rolled off, its forelegs and one hind leg going through a trestle, leaving the calf suspended by one hind leg and its short horns, wedged in between the ties on the trestle, where several trains passed over it. The section foreman being notified succeeded in prizing it out. No bones were broken, and it only seemed to be numb in its legs from its three-hour suspension in mid-air."

An Accommodating Railroad.

A correspondent of the *Lincoln (Neb.) State Journal* says: "Let none again say that the B. & M. Railroad Co. is a heathen corporation. One day this week the train from Kearney to this city had on a couple of pounds of beefsteak for a party at Lowell. The conductor forgot to put it off and did not discover his error until the train had run a mile this side of the station. The train was promptly stopped and backed up to Lowell and the steak delivered to its hungry owner."

A Runaway Car.

The other day a guard at the Washington Territory penitentiary saw a box-car moving along a railroad siding, apparently because it was on a down grade and had become uncoupled from the rest of the train. He threw a chuck under the wheels, stopping the car suddenly, and as he did so, heard a jingling of chains. Opening the car and looking in, he found six convicts, who were attempting to escape in this novel manner.

A Temperance Argument.

On the morning of Thursday, April 22, as a freight train on the New York, Lake Erie & Western road was approaching Deposit, N. Y., it was discovered that a car was on fire. The train was stopped and the fire extinguished. While at work putting out the fire an explosion followed in the car, which tore up the car considerably, and damaged some freight. No one was injured. It was discovered that a brake-hanger had broken a hole in the bottom of a car and then punched a hole through the head of a whiskey barrel, causing the whiskey to run out. Either from sparks or from

a hot brake-shoe, the whiskey took fire, resulting in the firing of the car and the explosion following. Were it not that Deposit has a reputation for a tendency to prohibition principles, as it were, it might be imagined that the toppers gazed with downcast mien on the destruction of the invigorating liquid.

A Train Wrecker Arrested.

A dispatch from Kalamazoo, Mich., April 23 says: "Henry Bailey, aged 19, has been arrested for attempting to wreck the east-bound train on the Michigan Central road Wednesday night, April 14. He made a confession, stating that he was led to the act to redress the wrongs his father had suffered from the company through a refusal to pay for the burning of 60 rods of fence. This is the fifth attempt to wreck trains in the same locality in three years."

TECHNICAL.

Locomotive Building.

The New York Locomotive Works in Rome, N. Y., have just sold two locomotives to the Arkansas & Louisiana road. The Baldwin Locomotive Works in Philadelphia have just completed a narrow-gauge freight engine of unusual weight for the Marietta & North Georgia road.

The East Tennessee, Virginia & Georgia shops in Atlanta, Ga., have just completed a new passenger engine for the road. It is the first locomotive built in these shops.

The Car Shops.

The Barney & Smith Manufacturing Co. in Dayton, O., has taken an order for 4 dining cars for the Chicago, Burlington & Northern road.

The LaFayette Car Works in LaFayette, Ind., have just completed 200 box-cars for the Cincinnati, Indianapolis, St. Louis & Chicago road.

The Buffalo Car Co. in Buffalo, N. Y., is to build 400 coal cars for the New York, Lake Erie & Western road.

The Union Pacific Co. will receive, until May 10, bids for 15 passenger cars, to be built to specifications and delivered at as early a date as possible. Copies of the specifications can be obtained from J. J. Burns, General Storekeeper, Omaha, Neb., to whom all bids and correspondence should be addressed.

Bridge Notes.

The contract for the superstructure of the new bridge over the Harlem River in New York City has been awarded to the Union Bridge Co., of New York and Buffalo, which was the lowest bidder. The bridge and approaches will be 2,370 ft. long, the principal portion of the bridge consisting of two steel arches, each of 508 ft. span.

The Union Bridge Co. is making a very heavy testing machine to be placed in the works at Athens, Pa. The Pittsburgh Steel Casting Co. furnishes the castings required.

Wilkins, Post & Co., of Atlanta, Ga., have taken the contract for the bridge over the Ocmulgee River, on the new Covington & Macon road in Georgia.

Iron and Steel.

The Canonsburg Iron & Steel Co. has been organized to build a blast furnace and steel works at Canonsburg, Washington County, Pa. The intention is to use natural gas as fuel.

The Aetna Iron Nail Co. in Bridgeport, O., has changed its name to the Aetna Iron & Steel Co. The change is made because the company no longer makes nails in its mill, and because steel now forms a considerable part of its product.

The Hartman Steel Co. in Beaver Falls, Pa., has begun the erection of a brick building 60 by 188 ft. as an addition to its works. The new building will contain machinery for the manufacture of a variety of articles from steel wire.

The Western Steel Co., lessee of the Vulcan Steel Works in St. Louis, is building the repairs to the works as rapidly as possible, and is also putting in some new machinery. The mill will be started up early in May on some large orders for steel rails which have been already secured.

Manufacturing and Business.

The Hazard Wire Rope Co. in Wilkes-Barre, Pa., recently shipped a wire rope 24,800 ft. long to the Philadelphia Traction Co. for use on its cable railroad. The rope weighed 32 tons.

The branch of the Suspension Car Truck Manufacturing Co. at Chicago has been attached for a claim of \$5,422 at the suit of Wm. P. Bement, and the Sheriff is now in possession of the stock of machinery there.

The Rail Market.

Steel Rails.—Prices continue steady at about \$35 per ton at Eastern mills for early deliveries, and \$34.50 for later orders. There are some inquiries on the market for large lots for late fall and winter deliveries, but none have recently been placed.

Rail Fastenings.—Business is improving and quotations are steady at 2.40 cents per lb. for spikes in Pittsburgh; 2.75@3 cents for track-bolts, and 1.70@1.80 cents for splice-bars.

Old Rails.—The market for old iron rails is very dull, and quotations are nominally at \$20@21 per ton at tidewater. Old steel rails are quoted at \$21@22 per ton in Pittsburgh.

Gauging the Flow of Streams.

At the last meeting of the Engineers' Club of Philadelphia, Mr. H. W. Sanborn described as follows the method used in gauging the flow of the Perkiomen, the Neshaminy, the Tohocken and tributary streams in Eastern Pennsylvania, in order to ascertain the approximate water supply which might be obtained from them:

"The rise and fall of the water during freshets were so sudden, and the stations, eleven in number, were so scattered—the water-sheds covering 500 square miles—that it was impossible to get to, and make measurements of, more than one or two streams during a freshet. Then, many times, the freshets would come in the night, and nothing could be done but the taking of continuous readings of the stream gauges."

"To overcome these difficulties with our small force, and get at least fair measurements of all the streams at the high point of a freshet, maximum stream gauges were set up on most of the streams. A place was chosen where the bed of the stream was uniform in width and slope, and two similar gauges set up. They were usually from 200 to 500 ft. apart. They were made in the form of a box from 8 to 12 ft. long, and 6 in. square inside. One side opened as a door. They were placed on end and shielded and supported by heavy timbers, imbedded in the soil or bolted to the rock bottom. Vertically through the centre of the box ran a brass rod, which was graduated. A metallic float ran on the rod in such a manner that it would rise with the water, but would remain fixed on the rod, at the highest point the water reached, after it had fallen. The two gauges were connected by levels, and from the gauge readings the slope of the water was determined. From this the velocity of the stream was found by the Kutter formula. The daily flows of all the streams have been tabulated, from the commencement of the gauging in July, 1883, to Jan. 1, 1886, and the field is still being continued. The daily flows have also been shown graphically

on sheets, with the rainfall on the water-shed and the temperature annexed. The connection between the three is well shown. Rain-gauge stations were established over all the water-sheds, and the data obtained from them, combined with that from previously existing gauges, which was kindly furnished us by the observers, have also been plotted graphically, showing plainly the variations of the rainfall over large areas. Three automatic rain-gauges were used to show the intensity of the storms."

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atlantic & Pacific, annual meeting, at the office in Boston, May 20.

Canadian Pacific, annual meeting, at the office in Montreal, May 12.

Central of New Jersey, annual meeting, at the office in Jersey City, May 7.

Chicago, Burlington & Quincy, annual meeting, at the office in Chicago, May 19.

Chicago & Northwestern, annual meeting, at the office in Chicago, June 3. Transfer books close May 5.

Delaware & Hudson Canal Co., annual meeting, at the office in New York, May 11, at noon.

Lake Shore & Michigan Southern, annual meeting, at the office in Cleveland, O., May 5.

Michigan Central, annual meeting, at the office in Detroit, May 6.

New York & Harlem, annual meeting, at the Grand Central Depot in New York, May 18, at noon.

New York, Susquehanna & Western, annual meeting in Jersey City, May 6.

St. Louis, Alton & Terre Haute, annual meeting, at the office in St. Louis, June 7. Transfer books close May 8.

St. Louis & San Francisco, annual meeting, at the office in St. Louis, May 12.

Vicksburg & Meridian, annual meeting, at the office in New York, May 3, at noon.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Boston & Maine, $4\frac{1}{2}$ per cent., semi-annual, payable May 15, to stockholders of record on April 23. This company raises its dividend from 4 to $4\frac{1}{2}$ per cent.

Manchester & Lawrence, 5 per cent., semi-annual, payable May 1, to stockholders of record on April 19.

Northern (New Hampshire), 3 per cent., semi-annual, payable May 1, to stockholders of record on April 9.

North & West Branch (leased to Pennsylvania Railroad Co.), 3 per cent., semi-annual, payable May 1. The dividend dates, heretofore June 1 and Dec. 1, will be May 1 and Nov. 1 hereafter.

St. Louis, Alton & Terre Haute, $2\frac{1}{2}$ per cent., semi-annual, on the preferred stock, payable May 1, to stockholders of record on April 27.

Railroad and Technical Conventions.

Meeting and conventions of railroad associations and technical societies will be held as follows:

The *Railroad Department of the Young Men's Christian Associations* will hold the fourth International Conference in Milwaukee, Wis., beginning at 7:30 p. m. on Thursday, May 6.

The *American Society of Mechanical Engineers* will hold its next meeting in Chicago, on Tuesday, May 25.

The *Master Car-Builders' Association* will hold its annual convention at Niagara Falls, beginning on Tuesday, June 8.

The *Master Mechanics' Association* will hold its annual convention in Boston, beginning on Tuesday, June 15.

The *Master Car-Builders' Club* will hold its regular monthly meetings at the rooms, No. 113 Liberty street, New York, on the evening of the third Thursday in each month.

The *New England Railroad Club* will hold its monthly meetings at its rooms in the Boston & Albany passenger station in Boston, on the evening of the second Wednesday in each month.

The *Western Railway Club* will hold its regular monthly meetings at its rooms, No. 103 Adams street in Chicago, on the third Wednesday in each month.

Foreclosure Sales.

The *Wheeling & Lake Erie* road was sold under foreclosure in Cleveland, O., April 23, under a decree issued by the United States Circuit Court, and was bought for \$505,000 by a committee consisting of Messrs. George S. Forrest, Melville C. Day and Daniel E. Garrison, and representing the bondholders.

The road extends from Toledo, O., to Bowers-town, 175 miles, with a branch to Huron, 14 miles long. By the last report there were \$2,550,000 in first-mortgage bonds and \$2,280,000 in second-mortgage bonds. The bonds were chiefly owned by the estate of the late Commodore Garrison, who furnished the money for building a large part of the line.

The *Wabash, St. Louis & Pacific* road was sold in St. Louis April 26, under the foreclosure of the mortgage. The property was bought by the Reorganization Committee for \$625,001. There were no other bidders and the purchase was made subject to the various prior liens noted in the decree of foreclosure. The purchase included all the property now operated by the Receivers and included in the notice of sale, with the exception of the St. Joseph & St. Louis road.

That branch was purchased for \$1 by W. F. Nesbit, representing its stockholders, the purchase representing only the Wabash leasehold interest in the road.

The *Louisville, Evansville & St. Louis* road will be sold in New Albany, Ind., June 9 next, under a final decree of foreclosure and sale which has just been granted by the United States Circuit Court. The foreclosure is of both the first and second mortgages, and the minimum price is fixed by the decree at \$750,000. The road extends from New Albany, Ind., to Mt. Vernon, Ill., 182 miles, with branches from Jasper, Ind., to Evansville, 55 miles, and from Gentryville to Rockport, Ind., 16 miles. By the last statement the company had outstanding \$3,000,000 first-mortgage bonds, \$1,000,000 second-mortgage bonds, \$2,977,300 income bonds and \$241,360 funded coupon scrip. There is also a first mortgage of \$900,000 on the Evansville Branch, which is not foreclosed, and the line will be sold subject to this mortgage.

Brotherhood of Locomotive Engineers.

A general meeting of the Brotherhood of Locomotive Engineers was held in Hartford, Conn., April 25, delegates being present from all the New England states and from New York, New Jersey and Pennsylvania. The proceedings were partly public and partly private, according to the custom of the brotherhood.

Grand Chief Engineer Arthur, who presided, made a speech, taking very conservative ground in relation to strikes, which, indeed, is the ground that has always been held by the brotherhood. Mr. Arthur spoke with particular reference to the recent strike in the Southwest, and referred to the efforts which had been made to induce the brotherhood to join with the Knights of Labor on the Missouri Pacific.

American Society of Mechanical Engineers.

The Spring Meeting of 1886 of the American Society of Mechanical Engineers, will be held in Chicago, beginning Tuesday, May 25, and adjourning Friday, May 28.

The headquarters of the Society and Secretary's rooms will be at the Grand Pacific Hotel, on the second or parlor floor. The sessions will be held in room A of the Grand Pacific Hotel.

It is hoped that as many as possible will stay at the Grand Pacific Hotel, where headquarters are, for the sake of the social opportunities which will be offered between sessions to those who are in the same house and for the sake of the special concessions there offered. The programme for the meeting is as follows:

First Day, Tuesday, May 25.—Opening session 8 p. m., Room A, Grand Pacific Hotel. An early adjournment will give time for the supper and reception tendered to the Society by the Local Reception Committee.

Second Day, Wednesday, May 26.—10:00 a. m., business session, reading of papers and discussions; 2:00 p. m., reading of papers and discussions. In the evening at 7:30 a complimentary dinner will be tendered by the Local Reception Committee at the Grand Pacific Hotel.

Third Day, Thursday, May 27.—An excursion tendered by the Chicago, Burlington & Quincy Railroad. The train will leave the Union Depot, corner of Canal and Madison streets, at 9 a. m., stopping at the Stock Yards, where the members will have an opportunity of visiting the large packing houses, and seeing one of Chicago's greatest industries. From the Stock Yards, the train will proceed to the city of Pullman, where the works of the Pullman Palace Car Co. will be visited, and from thence the train will proceed to the works of the North Chicago Rolling Mill Co. at South Chicago, where the members will witness the manufacture of steel rails after dark, and returning from there, the train will arrive in Chicago at 9:30 p. m.

Fourth Day, Friday, May 28.—The morning session will be devoted to the reading of papers and discussion. In the afternoon at 2 o'clock carriages will be provided by the Local Committee for the purpose of giving the members of the society an opportunity of seeing some of the attractions of the city, or visiting some of the engineering establishments, as they may elect. In the evening the last session will be held for papers and discussions and for general business. This final session will adjourn on Friday in time for every one to catch the evening trains to the East, as by the train schedules. A programme will be provided by the Local Committee giving the details of the excursion, carriage rides, etc.

Members are requested to register at headquarters on their arrival, and to wear during the meeting the badges which will be provided.

The Committee of Arrangements is composed as follows: Wm. F. Donovan, Chairman; N. C. Bassett, M. C. Bullock, Charles F. Elmes, C. C. Hill, A. F. Nagle, G. E. Palmer, J. A. Roche, Angus Sinclair, James N. Warrington and Hosea Webster.

ELECTIONS AND APPOINTMENTS.

American Association of Railroad Superintendents.—At the Cincinnati meeting officers for the ensuing year were chosen as follows: President, W. H. Stevenson, New York; First Vice-President, J. M. McKeen, Grand Rapids, Mich.; Second Vice-President, H. F. Royce, Davenport, Iowa; Third Vice-President, J. F. Divine, Wilmington, N. C.; Secretary, Waterman Stone, Providence, R. I.; Assistant Secretary, C. D. Hammond, Albany, N. Y.; Treasurer, R. M. Sully, Petersburg, Va.; Executive Committee, I. D. Barton, Long Island; J. T. Furber, Boston & Maine; L. W. Palmer, New York & New England; A. Q. Folsom, Boston & Providence.

Baltimore & Ohio & Chicago.—At the annual meeting in Garrett, Ind., last week, this company elected G. J. Foreacre, President; J. Hope Sutor, Secretary and Treasurer.

Boston & Maine.—General Manager Furber has issued a general order in which he says: "The Boston & Maine Railroad having leased the Worcester, Nashua & Rochester Railroad, will assume possession May 1, and will operate it as a division of the Boston & Maine system, which shall be known as the Worcester, Nashua & Portland Division. The offices of Division Superintendent, Division Freight Agent, Division Passenger Agent and Division Master Mechanic are hereby created, and these officers appointed, with headquarters at Worcester: Charles Howard, Division Superintendent; John M. Williams, Division Freight Agent; C. A. Waite, Division Passenger Agent; and Amos Barrett, Division Master Mechanic. Mr. Howard will also have the immediate charge of the maintenance of way and buildings on his division, and will report direct to the General Manager."

Repairs of cars on the division will be under charge of Master Car-Builders Richardson at Lawrence; conductors and agents will be responsible to Treasurer Blanchard at Boston; the accounting department will be taken to Boston and will be under charge of Auditor Hobbs, and supplies will be furnished by Purchasing Agent Fisher at Boston.

Central Ohio.—This company, whose road is leased to the Baltimore & Ohio, elected the following directors in Columbus, O., April 28: Daniel Applegate, W. B. Brooks, J. B. Collins, A. B. Crane, Thomas Fitzgerald, J. G. Foreacre, Robert Garrett, J. W. Hall, Joshua G. Harvey, J. W. Jenkins, C. H. Kibler, A. Latrobe, Orland Smith.

Central Pacific.—At the annual meeting in San Francisco, April 13, the following directors were chosen: Charles Crocker, Charles F. Crocker, Timothy Hopkins, C. P. Huntington, W. V. Huntington, E. H. Miller, Jr., Leland Stanford.

Chesapeake & Ohio.—Mr. James P. Nelson has been appointed Assistant Engineer in place of M. Quimby, deceased. Mr. Nelson was recently on the Richmond & Danville road.

Chicago & West Michigan.—This company last week elected directors as follows: J. B. Mulliken, Detroit, Mich.; Charles Francis Adams, Jr., J. H. Blake, Alpheus Hardy, H. H. Hunnewell, Charles Nieman, George D. Shattuck, E. V. R. Thayer, Nathaniel Thayer, Boston.

Danville & Northwestern.—The completed organization of this company is as follows: President, J. E. Schofield; directors, W. F. Buckner, Francis X. Burton, B. S. Crews, W. P. Durham, T. B. Fitzgerald, W. T. Towers; Secretary, W. T. Towers. Office in Danville, Virginia.

East and West of Alabama.—At the annual meeting at Cross Plains, Ala., April 21, the following directors were chosen: J. W. Inzer, Asheville, Ala.; J. R. Barber, T. J. Nicholl, A. G. West, Cedartown, Ga.; J. Hull Browning, Tenaflly, N. J.; E. F. Browning, Wm. C. Browning, New York. The board elected E. F. Browning, President; A. G. West, Vice-President; J. Hull Browning, Secretary and Treasurer; J. R. Barber, Assistant Secretary and Local Treasurer.

Erie Dispatch.—General Manager George W. Ristine gives notice that the general offices of this line have been removed to No. 205 La Salle street, Chicago.

Fremont, Elkhorn & Missouri Valley.—Hon. John B. Hawley is appointed General Attorney of this company, to take effect May 1. Office at Fremont, Nebraska.

Kansas City, Memphis & Birmingham.—Mr. J. A. Grant has been appointed Chief Engineer. Mr. J. C. Turner is appointed Assistant Engineer.

New York, Providence & Boston.—Mr. J. W. Miller has been appointed General Manager, a new office. He was recently Vice-President and General Superintendent of the St. Louis, Fort Scott & Wichita.

Northern Pacific.—Mr. J. M. Hannaford, long General Freight Agent, has been promoted to be General Traffic Manager.

North & West Branch.—At the annual meeting of this company, whose road is leased to the Pennsylvania Railroad Co., in Philadelphia, April 27, the old officers and directors were re-elected.

Providence & Stonington Steamship Co.—Mr. J. W. Miller is appointed General Manager. He is also General Manager of the New York, Providence & Boston road.

Richmond & Danville.—The following order from General Manager E. B. Thomas, is dated Richmond, Va., April 16: "This Company having leased the railroad and property of the Virginia Midland Railway Co., to take effect from this date, and the transfer having been made, the said Virginia Midland Railway will hereafter be operated by this company as the Virginia Midland Division."

"The following general officers of this company, in their respective departments, will assume charge of the business of that division: Peyton Randolph, Assistant General Manager; Sol. Haas, Traffic Manager; J. H. Drake, General Freight Agent; C. W. Chears, Assistant General Passenger Agent; J. P. Minette, General Purchasing Agent; W. A. Moody, Car Record and Trace Agent; C. M. Bolton, Chief Engineer, who will have general supervision of surveys and new construction, with such other duties as may from time to time be assigned to him by the General Manager; R. D. Wade, Superintendent of Motive Power, who will have general supervision of the Motive Power Department of the Virginia Midland Division."

"The following division officers, with offices at Alexandria, Va., will, under direction of the respective heads of departments, remain in charge, as heretofore: Robert Andrews, Superintendent; H. M. Smith, Master Mechanic; J. S. B. Thompson, Assistant General Freight & Passenger Agent."

"Instructions to agents and connections in regard to the Accounting Department will be issued by the Comptroller."

Roanoke & Southern.—This new company has elected officers as follows: President, D. F. Houston; Vice-President, H. C. Liester; directors, W. K. Andrews, J. F. Christian, J. M. Gambill, J. D. Kirk, Andrew Lewis, J. C. Momant, Robert Sanders, D. W. Spencer, I. M. Starking, P. L. Terry, H. S. Trent. Office in Roanoke, Virginia.

St. Louis Bridge.—Mr. J. F. Sechler is appointed Master Mechanic in place of G. W. Walshe, resigned.

Sanford & Lake Eustis.—At the annual meeting in Sanford, Fla., recently, the following officers were chosen: J. N. Bishop, President; E. R. Trafford, Vice-President; R. H. Marks, Secretary; J. F. Wellborn, Attorney; F. P. Foster, Treasurer.

Siox City & Pacific.—Hon. John B. Hawley is appointed General Attorney of this company, to take effect May 1. Office at Fremont, Nebraska.

Southern Pacific (of California).—At the annual meeting in San Francisco, April 14, the following directors were chosen: Charles Crocker, Charles F. Crocker, Timothy Hopkins, W. V. Huntington, Charles Mayne, N. T. Smith, J. L. Willcutt.

The leased lines elected directors as below: *Los Angeles & San Diego.*—Leland Stanford, Charles F. Crocker, N. T. Smith, J. L. Willcutt, E. H. Miller, Jr., *Park & Ocean.*—Charles F. Crocker, Timothy Hopkins, N. T. Smith, J. L. Willcutt, Ariel Lathrop. *Ocean Beach.*—Leland Stanford, Charles F. Crocker, Timothy Hopkins, N. T. Smith, J. L. Willcutt. *Monterey.*—Charles Crocker, Charles F. Crocker, Timothy Hopkins, N. T. Smith, J. L. Willcutt. *Pajaro & Santa Cruz.*—Charles F. Crocker, Timothy Hopkins, N. T. Smith, J. L. Willcutt, A. C. Bassett.

Texas & St. Louis.—Mr. Richard P. Morgan, Jr., has been appointed Chief Engineer, and will have full charge of the change to standard gauge and the general reconstruction of the road. Mr. Morgan is an engineer of wide experience and reputation. He was at one time Railroad Commissioner of Illinois.

Valley of Ohio.—At the annual meeting in Cleveland, O., last week, the old board was re-elected, and subsequently elected J. H. Wade, President; D. L. King, Vice-President; Isaac Reynolds, General Manager; W. B. Porter, Secretary and Auditor; S. T. Everett, Treasurer.

PERSONAL.

—Mr. Edward M. Taylor, editor and manager of the *Buffalo Railway Herald*, died in Rochester, N. Y., April 24, aged 38 years.

—It is reported that Mr. M. M. Greene, will shortly resign his position as President of the Columbus, Hocking Valley & Toledo Co., on account of failing health.

—Mr. J. W. Miller has resigned his position as Vice-President and General Superintendent of the St. Louis, Fort Scott & Wichita road, to accept a position on the New York, Providence & Boston road.

—Mr. A. H. Gorton, General Superintendent of the railroad lines operated by the Fall Brook Coal Co., died very suddenly at his residence in Corning, N. Y., April 26, of apoplexy. Mr. Gorton had been connected with the Fall Brook Coal Co. for a number of years.

—Mr. Augustine W. Wright has resigned his position as Chief Engineer and Superintendent of Track and Construction of the North Chicago City Railroad, after nearly eight years' service in that capacity. Mr. Wright has opened an office as Consulting Engineer for street railroads at No. 185 Dearborn street, in Chicago.

—Mr. Charles Wurts, Road Foreman of Engines of the Amboy Division of the Pennsylvania Railroad, died at his residence in Jamesburg, N. J., April 27, aged 52 years. Mr. Wurts entered the employ of the old Camden & Amboy Co. 35 years ago, and has been on the road ever since, as fireman, locomotive engineer and in his last position, to which he was appointed several years ago.

—Col. Abner Tibbetts, of El Paso, Tex., was found dead in his berth in a sleeping car on a train on the Mexican Central road near Fresno, Mex., on the morning of April 25. He was President of the El Paso, St. Louis & Chicago Co., and had just returned from a trip East in the interest of that pro-

jected line. He had just started for the city of Mexico in company with ex-Secretary Windom, on business connected with the projected Topolovampo line. The cause of his death is supposed to have been heart disease.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

Three months to March 31:				
	1885.	Inc. or Dec.	P. c.	
Cleve. & Canton...	\$71,169	\$66,673 I.	\$4,496	6.7
Net earnings....	15,665	10,014 I.	5,651	56.5
Long Island.....	480,999	456,715 I.	24,284	5.3
Net earnings....	96,929	79,909 I.	17,020	21.3
Mexican National...	396,589	400,787 D.	4,198	1.0
N. Y. Sus. & W....	245,211	230,268 I.	14,943	6.5
Norfolk & West....	718,002	645,952 I.	72,050	11.0
Net earnings....	282,930	261,438 I.	21,492	8.0
Northern Central...	1,291,231	1,276,625 I.	14,606	1.1
Net earnings....	515,786	531,556 D.	17,170	3.2
Northern Pacific...	1,932,686	1,815,158 I.	117,528	6.5
Net earnings....	621,821	518,155 I.	103,666	20.0
Pennsylvania.....	10,872,857	9,988,587 I.	884,270	8.9
Net earnings....	3,524,715	2,981,862 I.	542,753	18.2
St. Jo. & Gd. I....	278,610	289,693 D.	10,883	3.8
Net earnings....	136,792	108,069 I.	28,723	26.6
Two months to Feb. 28:				
Cleve. & Canton...	\$374,176	\$368,919 I.	\$5,257	1.4
Net earnings....	87,779	89,043 D.	1,264	1.4
Oreg. Short Line...	217,582	191,019 I.	26,563	15.9
Net earnings....	14,336	24,658 D.	10,322	41.3
Peoria, Dec. & E....	115,408	116,807 D.	1,399	1.2
Net earnings....	58,271	54,647 I.	4,224	7.8
Rome, W. & Og....	242,361	207,405 I.	34,956	16.8
Net earnings....	62,853	38,587 I.	24,266	62.9
Month of February:				
Cleve. & Canton...	\$21,630	\$22,104 D.	\$474	2.0
Net earnings....	3,388	3,494 I.	106	3.1
Gr. B. W. & St. P....	21,378	17,483 I.	3,895	22.3
Maine Central....	187,049	185,725 I.	1,324	0.7
Net earnings....	52,140	52,566 D.	426	0.8
Oreg. Short Line...	104,331	89,600 I.	14,731	16.4
Net earnings....	3,077	7 I.	3,084	100.0
Peoria, Dec. & E....	60,488	55,531 I.	4,957	8.8
Net earnings....	32,087	25,160 I.	7,927	30.1
Rome, W. & Og....	118,515	93,010 I.	25,505	27.5
Net earnings....	32,860	12,610 I.	20,250	160.7
Month of March:				
Cleve. & Canton...	\$28,709	\$24,400 I.	\$4,309	17.6
Net earnings....	9,557	4,905 I.	4,652	95.0
Mexican National...	151,579	137,589 I.	13,990	10.1
N. Y. Sus. & W....	89,179	91,038 D.	1,919	2.1
Norfolk & West....	277,707	220,414 I.	56,891	26.0
Net earnings....	120,932	86,171 I.	34,761	40.0
Northern Cen....	460,147	483,360 D.	23,213	4.8
Net earnings....	198,218	228,405 D.	30,187	13.2
Northern Pacific...	858,116	691,612 I.	166,504	24.0
Net earnings....	409,061	237,138 I.	171,923	34.3
Pennsylvania.....	3,901,855	3,635,374 I.	266,481	7.3
Net earnings....	1,305,780	1,161,109 I.	144,671	12.5
St. Jo. & Gd. I....	112,435	118,695 D.	6,260	5.3
Net earnings....	65,487	55,168 I.	10,319	18.8
Third week in April:				
Buff. & Pitts....	\$18,707	\$24,053 D.	\$5,756	23.9
Canadian Pacific...	193,000	176,000 I.	17,000	9.7
Chi. & Alton.....	180,938	157,902 I.	23,036	19.9
Chi. & East. Ill....	35,384	31,705 I.	3,679	11.4
Chi. Mil. & St. P....	367,000	406,546 D.	19,546	4.8
Chi. & Nor. West...	366,262	415,989 D.	49,727	11.6
C. St. P. M. & O....	102,900	99,000 I.	3,900	3.9
C. I. St. L. & C....	47,250	41,800 I.	5,450	13.0
Illinois Central...	185,700	200,026 D.	14,326	7.2
Iowa lines.....	31,600	31,544 I.	56	0.2
Louis. & Nashv....	228,065	268,315 D.	33,620	14.4
Mil. & Northern...	13,150	10,680 I.	2,470	22.8
Oreg. R. & N. Co....	82,861	64,544 I.	18,417	28.7
St. L. & San F....	81,100	79,360 I.	1,800	2.3

* Deficit.

Weekly earnings are usually estimated in part, and are subject to correction by later statements. The same remark applies to early statements of monthly earnings.

Coal.

Coal tonnages for the week ending April 17 are reported as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Anthracite.....	594,574	678,232 D.	83,658	9.7
Eastern bituminous...	149,058	198,390 D.	49,332	24.9
Coke.....	73,212	50,097 I.	23,115	46.2

A general increase in prices of anthracite coal has been agreed on, but it is thought that it can hardly be carried out in the present state of the market.

The strike in the Cumberland, Clearfield and adjoining districts still continues, and at present there seems to be a prospect of a long suspension.

Pennsylvania Railroad coal tonnages for the week ending April 24 was:

	Coal.	Coke.	Total.	1885.
Line of road.....	117,677	70,932	188,609	177,556
From other lines....	81,713	108	81,821	92,604
Total.....	199,390	71,040	270,430	260,160
Year to April 24....	3,525,399	877,866	4,403,265	4,602,712
Increase for the week, 10,270 tons, or 3.9 per cent.; increase for the year, 340,523 tons, or 8.4 per cent.				

Indianapolis Car Movement.

The number of cars received and forwarded at Indianapolis has been:

	Week ending—			
	April 3.	April 10.	April 17.	April 24.
1886—Total.....	15,960	14,599	17,081	17,592
Loaded.....	11,830	10,669	12,970	13,834
1885—Total.....	19,801	18,270	16,758	16,758
Loaded.....	15,233	13,372	13,533	13,533

The increase last week over the previous week was in west-bound cars, the east-bound business having been light.

New York State Canals.

The Superintendent of Public Works gives notice that the Erie and the Champlain canals will be opened for navigation on Saturday, May 1.

Southwestern Railway Association.

The total earnings of the lines in the Southwestern Railway Association during the month of March were as follows:

Roads.	West-bound.	East-bound.	Total.	Revenue.
Chicago & Alton.....	\$95,680	\$90,576	\$186,256	\$156,696
C. B. & Q.....	70,839	32,621	103,460	103,461
Quincy Line.....	30,514	5,967	36,481	36,482
Hopkins Line.....	7,499	4,404	11,903	11,904
C. & St. J.....	80,043	10,564	90,607	90,608
H. & R. I. & P.....	86,950	74,273	161,223	161,223
Mo. Pacific.....	13,902	44,893	58,795	58,795
Totals.....	\$385,440	\$231,721	\$617,161	\$617,171
C. B. & Q. B. & M. Pts.	4,562	20,102	24,664	24,665
Mo. Pac. & Ext. Pts.	1,443	850	2,293	2,294
Mo. Pac. June. Pts.	2,924	7,263	10,187	10,187
Grand totals.....	\$394,371	\$261,949	\$656,320	\$656,320

The total earnings in February were \$715,232, and in January \$440,713. For the quarter ending March 31 the total amount of earnings was \$1,812,265.

Transcontinental Passenger Rates.

Passenger rates to Pacific Coast points have been largely increased, apparently by common consent, although there has been no formal agreement. The fares are still much lower than when the war began. The Union Pacific now makes rates from Missouri River points to San Francisco \$60 unlimited, \$50 limited and \$35 second class. The Atchison, Topeka & Santa Fe has made its rates to San Francisco from the Missouri River \$50 first and \$35 second class, but also maintains a rate of \$40 first and \$30 second-class to Los Angeles and points on the California Southern. All these rates are without rebate.

Transcontinental Freight Rates.

Although no agreement has been reached by the companies, there has been a general increase in freight rates to Pacific Coast points, made apparently by common consent. The prevailing rates from Chicago and New York to San Francisco are now about one-half the old rates.

The disturbing points seem to be the opening of the Canadian Pacific next month, and the position of the Pacific Mail Steamship Co., which will decline to maintain rates unless it is paid a subsidy. It is announced that the company will not be satisfied with a return to the old agreement, but will demand \$100,000 a month, which will hardly be conceded.

Passes and Half-fare Tickets.

The Central Traffic Association and the Central Passenger Committee have adopted the following rules regarding the issue of free passes and half-fare tickets:

"Tickets not less than half the lowest unlimited fare to any point within the jurisdiction of the Central Traffic Association, including trunk-line territory and the seaboard, may be sold to the following classes of persons upon orders to be prepared by the Chairman, under such rules as he may prescribe: Well-defined cases of charity; employees of railway, express and sleeping-car companies; United States army officers and their families when traveling on leave of absence; proprietors, editors or business-managers of well-established newspapers, no concessions to be made to reporters, correspondents, or other employees of such newspapers. No company or line member of this committee shall make any reduced fare, issue free passes or tickets, or adopt special transportation methods for particular occasions having the effect to influence through passenger business, except by authority of the Chairman, in the manner and for the purposes set forth in these rules. No passes shall be issued to passenger and ticket agents, or other persons employed by connecting lines, in passenger service, except upon the request of the general passenger or ticket agent of the company in whose employ the applicant may be."

Boston Traffic Notes.

The Boston & Albany received from the New York Central at Albany 11,367 freight cars in March, and sent from Boston 8,690 west-bound cars.

Southern Railway & Steamship Association.

The Arbitrators, Messrs. John Screven, Thomas H. Carter and E. K. Sibley, have rendered the following decision and award in the case of differentials at Spartanburg, S. C., submitted to the Board of Arbitration by the Richmond & Danville Railroad Co. and the Central Railroad & Banking Co. of Georgia: "The Board decides and awards that there shall be a differential in the rates at Spartanburg, S. C., as between Richmond and group, and Charleston and group, in favor of Charleston and group, as follows: On the lettered classes, A, 3; B, 3; C, 4; D, 5; E, 4; F, 8; and H, 5; on cotton, 6 cents per 100 lbs.; on fertilizers, 25 cents per ton." The Rate Committee held a meeting in Atlanta, Ga., last week, which continued for two days. The business conducted was chiefly of a routine character, in the arrangement of classifications and adjustment of rates to various points. No general change in rates was made, but the readjustment made in a number of cases involved slight reductions.

Petroleum.

The production and shipments of petroleum from the Pennsylvania and New York oil wells in March are given by *Stovell's Petroleum Reporter* as follows, in barrels of 42 gallons:

	1886.	1885.	Inc. or Dec.	P. c.
Production.....	1,928,448	1,438,133	490,315	17.1
Shipments.....	2,055,730	1,887,624	168,106	8.9
Stock, March 21....	39,955,493	36,508,236	3,447,257	7.0
Producing wells....				

An increase of 163 producing wells was reported during the month. There were 291 new wells completed and 44 dry holes reported, with 356 new wells under the drill on March 31.

Stock was decreased during the month by 127,282 barrels, that being the excess of shipments over production.

The shipments were larger than for either of the earlier months of this year, and were exceeded only in three months of last year.

Of the total production the Allegheny District in New York furnished 9.4 per cent.; the Bradford District, 34.3; the Warren District, 13.9, and the Lower District 42.4 per cent.

The shipments made from the various producing districts were destined as follows:

	Crude.	Refined.	Total.	P. c.
New York.....	550,172	61,293	611,465	29.7
Philadelphia.....	507,107	30,730	537,837	26.2
Baltimore.....	93,815	11,689	105,504	5.1
Boston.....	17,109	74,427	91,536	4.4
Cleveland.....	332,406	...	332,406	16.2
Pittsburgh.....	60,941	...	60,941	3.0
Local points.....	246,811	69,182	315,993	15.4
Total.....	1,808,419	247,311	2,055,730	100.0

In this statement the refined oil is that refined at the Creek refineries; it is reduced to its equivalent in crude, so that the total represents the amount of crude oil shipped to each point, whether in crude or in refined form.

Cotton.

Cotton movement for the week ending April 23 is reported as follows, in bales:

	1886.	1885.	Inc. or Dec.	P. c.
Receipts.....	24,207	8,076	16,131	200.1
Shipments.....	48,741	18,916	29,825	163.0
Stock, April 23....	271,336	109,983	161,353	153.6
Seaports:				
Exports.....	43,960	19,122	24,838	130.7
Imports.....	52,128	46,519	5,609	12.0
Stock, April 23....	729,489	575,357	154,132	9.4

The total shipments from plantations for the crop year to April 23 is estimated at 6,130,020 bales, against 5,506,890 last year, 5,497,232 in 1883-84, and 6,597,554 in 1882-83.

Central Traffic Association.

The following circular from Assistant Commissioner George H. Daniels is dated Chicago, April 17:

"Your attention is respectfully called to a resolution unanimously adopted by the Passenger Committee of the Central Traffic Association at its meeting in Chicago, April 15, as follows:

"Resolved, That in order to throw proper safeguards around the issue of passes on account of the Passenger De-

partment, it is hereby agreed that no passes shall be issued to passenger or ticket agents or other persons employed by connecting lines in the passenger service, except upon the request of the General Passenger or Ticket Agent of the company in whose employ the applicant may be."

"It is hoped that in making requests for passes they will be made in accordance with the above, so as to prevent unnecessary delays."

Central Iowa Traffic Association.

The Central Iowa Traffic Association held a meeting in Chicago last week the principal business transacted being the agreement to pool the lumber traffic from Chicago to Central Iowa points, from May 1. It was decided to request Mr. George L. Carman to prepare rates and divisions for the pool, but Mr. Carman subsequently declined, on account of other engagements, and a new arbitrator will have to be chosen.

Northwestern Freight Rates.

The cutting of rates of the lines northwest of Chicago was suddenly stopped last week by agreement among the companies and there was a general restoration of rates. A meeting is to be held in Chicago this week, at which it is thought probable that the Northwestern pool will be renewed and a new agreement formed.

New England Traffic Notes.

The North Adams car record office shows the number of cars received from and delivered to the connecting roads passing through the Hoosac Tunnel in March, as compared with 1885 and 1884, as follows:

	1886.	1885.	1884.
Fitchburg.....	16,327	13,832	10,470
B. H. T. & W.....	13,440	13,223	9,717
Troy & Boston.....	4,691	2,791	2,654
New Haven & Northampton.....	937	924	651
Total.....	35,395	30,770	23,492

The increase this year over March, 1885, was 4,625 cars, or 15.0 per cent.; over March, 1884, it was 11,903, or 50.7 per cent.

RAILROAD LAW.

Payment of Employees in Massachusetts.

The Massachusetts Legislature has passed the law requiring manufacturing corporations to pay their employees weekly. This law has been agitated for several years, but has failed to pass until this year. It applies to railroad companies as well as manufacturing corporations, and in consequence the railroad companies in that state will have to make arrangements to pay off their employees weekly instead of monthly, as has been the general custom in Massachusetts, and, indeed, all over the United States. The law takes effect July 1. Most of the companies will wait until that date, although several of them, including the Boston & Albany, have made arrangements to begin the new system sooner.

Foreclosures in Massachusetts.

The following act has been passed by the Massachusetts Legislature and approved by the Governor:

Section 1. A purchaser of a railroad at a sale under a valid foreclosure of a legal mortgage thereof and his grantee and successors in title shall be subject to all the same duties, liabilities, restrictions and other provisions respecting such railroad or arising from the construction, maintenance and operation thereof, and have all the same powers and rights relating to said railroad, and the construction, maintenance and operation thereof, which the corporation by which said mortgage was made, was subject to and had at the time of said sale.

S-c. 2. This act shall take effect upon its passage, but nothing herein contained shall be a confirmation, ratification or approval of any existing mortgage or of any foreclosure proceedings thereunder, nor affect in any manner the right of such corporation, or its stockholders, to set up the invalidity of such mortgage or proceedings.

Damages from Fire Caused by a Railroad Accident.

payment system next month. It is stated that this change will entail other departures from the customs heretofore in vogue on the road. For instance, conductors who, in common with the rest of the employees, have been paid monthly, have been given a week's vacation in each year; their pay has gone on when they were sick, and they have received no extra pay for extra work. Hereafter, it is said, they will be put upon a day's basis, receiving so much for each day's actual service. If they are prevented from working by sickness, they will lose their pay during their absence; if they desire a vacation, they will have to take it at their own expense; they will, however, be given extra pay for extra work.

Boston & Maine.—General Manager Furber has issued a general order announcing that this company will assume possession of the Worcester, Nashua & Rochester Railroad on May 1, and will operate the road as a division of its own line, to be known as the Worcester, Nashua & Portland Division. From May 1 all accounts will be kept in the Boston & Maine offices in Boston.

Brunswick & Western.—It is stated that work will shortly be begun on a branch of this road from Isabella, Ga., some 20 miles eastward from the terminus at Albany, north-west to Americus, a distance of about 45 miles. This extension will be built by the company without local aid for the purpose of securing additional business both from local points along the line and from Americus itself, which is the centre of a productive cotton country.

Canadian Pacific.—A statement published in London gives the following as the amount of fixed charges for 1886: As given in last report \$2,610,000. Liabilities added since that date: Manitoba & Southwestern (\$2,950,000 bonds at 5 per cent.) 102,500. North Shore Railway (say \$3,970,000 at 5 per cent.) 198,000. Difference between 5 per cent. and 4 per cent. on \$20,000,000 bonds now issued 200,000.

Total \$3,110,500. The liabilities capitalized are as follows: Bonds, debenture stock, leases, etc. \$61,803,000. Land grant bonds (which are nearly all covered by sales of land already made) 3,687,000.

Common stock (at par) \$65,490,000. Total, about \$130,500,000.

The issue of bonds just placed in London was \$4,191,590, at 5 per cent. These bonds were issued at 104, the proceeds being used to pay the debt due the Canadian government.

Cape Fear & Yadkin Valley.—Tracklaying on the extension of this road from Greensboro, N. C., northwest to Mt. Airy, began on April 28. A large part of the grading is completed, and the work can be continued without delay.

Central, of New Jersey.—The counsel in the Vail suit on April 27 presented to the Chancellor of New Jersey a draft of a final decree, setting aside the lease of this road to the Philadelphia & Reading Co., in accordance with the decision recently made by the Chancellor. After hearing arguments on the proposed decree the Chancellor took it and reserved his decision.

The counsel for the Receivers of the Philadelphia & Reading Co. appeared before the Chancellor of New Jersey, April 27, and requested him to postpone the sale of the \$3,000,000 Reading bonds pledged for the Central floating debt, which were advertised to be sold in New York, April 28, in pursuance of an order of the court. President Gowen also appeared for the same purpose, asking that the sale might be delayed in order that the Court of Appeals may pass upon the order. It will be remembered that Mr. Gowen asked several weeks ago that the same might be postponed, promising to furnish funds to pay off the debt. He has not yet done so, however, and now urged the postponement on the ground that the securities would necessarily be sold at a great sacrifice. The Chancellor said, after hearing arguments, that there was no assurance that the securities would be worth more in the future and refused to grant any order for postponement.

The pledged bonds were offered at public sale in New York, April 28. The \$1,000,000 first series Reading 5s went in lots at from 55 to 60, the total amount realized being \$578,250. The \$2,000,000 second series 5s were then offered, but after \$100,000 had been sold at 25½, bringing \$25,500, the rest were withdrawn and the sale postponed for a day. The bonds sold were bought by Mr. Wharton Barker of Philadelphia.

Chester, Greenwood & Abbeville.—The incorporators of this South Carolina company recently held a meeting and appointed a committee to open books for subscription along the line. As soon as the necessary amount of stock has been subscribed a meeting will be held to organize a company. The projected line is from Chester, S. C., through Greenwood and Abbeville, to the Georgia line, and the road is intended to form part of a projected line from Monroe, N. C., to Atlanta, Ga. A company has already been organized in North Carolina.

Chicago, Burlington & Northern.—The track laid on this road for the week ending April 17 was as follows: Main track. Sidings. Savannah, Ill., north 4.830 1.897. " south 4.623 0.328. " east 0.566 0.592. East Dubuque, Ill. 0.208 1.674. La Crosse, Wis., north 8.360 0.488. Oregon, Ill. 0.356 1.060. Newport, Wis. 6.049. Total 18.943 6.049.

In the statement for April 10 there was an excess of 1.548 miles main track and 0.304 sidings. Deducting this, the total track laid to April 17 was 106.543 miles main track and 7.818 miles sidings.

Chicago, Freeport & St. Paul.—It is again reported that work will be soon begun on the grading of this road from Freeport, Ill., to Blanchardville.

Chicago & Northwestern.—Regarding the new bonds, Vice-President Sykes is reported as saying that the \$20,000,000 issue of 4 per cent. bonds is mainly to provide for roads now being constructed, particularly the Fremont, Elkhorn & Missouri Valley.

"We are constructing about 150 miles of this road into Nebraska, and instead of selling the 6 per cent. old consol mortgages, which are worth 125, we propose to put these into a trust and issue our own 4 per cents. against them, and also issue our 4 per cents. for the purpose of constructing the Wyoming Central, the first mortgage of which will be issued as collateral securities for our bonds."

"There is nothing new in this construction movement. It is simply to provide 4 per cent. securities to be used in a collateral trust at a rate not to exceed \$20,000 a mile, which may be constructed in the future as the requirements of our company may demand. We hope that the present plan will provide the Chicago & Northwestern with sufficient funds for the next 10 or 15 years for the construction of all the new roads it may require."

Surveys are being made for the extension of the Maple River branch of this road from its present terminus at Mapleton, Ia., westward to Onawa, a distance of 24 miles. This extension will give the company a new connection with Sioux City somewhat shorter than any of its existing lines.

Chicago, Rock Island & Pacific.—This company announces that it intends to issue \$10,000,000 in new collateral trust bonds, bearing 5 per cent. interest, the proceeds to be applied in building extensions of the road west of the Missouri River, and principally in Kansas and Nebraska. The issue will be at the rate of about \$15,000 per mile on the road to be constructed, the total length of which will be nearly 700 miles. No definite announcement has yet been made as to the lines to be constructed. The new bonds have all been taken by a syndicate represented by Kuhn, Loeb & Co., at a price which is said to be 108.

Cincinnati, Hamilton & Dayton.—A suit was begun in the Superior Court in Cincinnati, April 21, by Eugene Zimmerman, against Hugh J. Jewett, A. S. Winslow and others. The object of the suit is to set aside the agreement for pooling the stock, recently entered into by holders of a majority of the stock of this company. Mr. Zimmerman claims to represent the stockholders who did not join in the pool, and he claims that the effect of the agreement is to deprive them of all voice in the management of the company, and therefore asks that the agreement be set aside so far as it confers upon trustees the right to vote on the pooled stock. It is understood that this suit will be actively contested.

Cleveland & Canton.—The statement for March and the three months to March 31 is as follows:

	1886.	1885.	Three months—1886.	1885.
Earnings	\$28,700	\$24,400	\$71,169	\$66,672
Expenses	19,152	19,495	55,504	56,658
Net earnings	\$9,557	\$4,905	\$15,665	\$10,014

For the three months the gross earnings increased \$4,497, or 6.7 per cent., and the expenses decreased \$1,154, or 2.0 per cent., the result being a gain of \$5,651, or 56.5 per cent., in net earnings.

Columbus & Western.—It is stated that arrangements have been made to extend this road from its present terminus at Goodwater, Ala., northwest to Birmingham, about 55 miles. The principal object of the extension is to meet and connect at Birmingham with the extension of the Kansas City, Springfield & Memphis road.

Covington & Macon.—Grading is actively in progress on this road and the officers of the company state that tracklaying will be begun near Macon, Ga., early in May. The work is now well advanced from Macon northward to Monticello, and some progress has been made between that place and the crossing of the Georgia Railroad. It has not yet been decided, or at least not yet publicly announced, whether the road will cross the Georgia Railroad at Covington or somewhat to the eastward.

Des Moines, Osceola & Southern.—Bills have been filed in the United States Circuit Court, at Des Moines, Ia., to foreclose the mortgages on this road. It is understood that the suit is to be pressed, and that the bondholders have arranged to buy in the road, and to improve and extend it. It is now in operation from Des Moines to Cainsville, Mo., 111 miles.

Detroit, Lansing & Northern.—Bids will be received at the office of J. J. McVean, Chief Engineer, at Ionia, Mich., until May 10, for clearing, grading, trestling, tracklaying and ballasting the extension of the Saginaw & Western road from Lake View, Mich., to Howard City, about 10 miles. The profile and specifications can be seen at the office in Ionia after May 3.

Dublin & Wrightsville.—This road is now completed to the Oconee River, 7½ miles southwest from the late terminus at Bruton, Ga., and 19 miles from Wrightsville. The completion of the bridge across the Oconee and about one-half mile of track will carry the road to Dublin, which is to be its terminus.

East St. Louis Strike.—The roads running into East St. Louis are working without interruption, except in the case of the Belt line, which has been unable to secure men enough to run its road. The railroad property is still guarded by the state militia, and there has been no attempt to disturb it, although there have been a few isolated attempts at violence, such as firing at soldiers at night, threatening men who have gone to work and the like. The railroad companies fear another outbreak when the guards are withdrawn, but this seems doubtful.

East Tennessee, Virginia & Georgia.—The reorganization committee reports that assents have been received to its plan of reorganization from holders of \$14,325,000 out of the total of \$14,670,000 consolidated bonds. The committee states that a majority of the income bonds have also been deposited.

This company has already begun changing the gauge of its line. The Alabama Central Division, extending from Selma, Ala., to Meridian, Miss., 113 miles, was changed last week, and preparations are already made for changing several of the branches of the road before the time comes for the general change of the main line.

Fort Worth & Denver City.—The directors have decided to begin work at once upon an extension of this road from the present terminus at Harrold, Tex., northwest to Quanah in Hardeman County, a distance of 50 miles. The building of this extension, it is stated, is warranted by the promised local traffic along the line.

Georgia Railroad Commission.—The Georgia Commission last week listened to arguments on certain charges of discriminations made against the railroad companies by the Atlanta Chamber of Commerce. The charges were made by the Southern Railway and Steamship Association, and are based upon the claim that the pooling agreement of the Association discriminates in several points against the city of Atlanta. The question was presented on behalf of the Chamber of Commerce by John N. Dunn and Aaron Haas. The railroad companies complained of demurred to the complaint, upon the ground that the Commission had no jurisdiction of the case, as the discriminations complained of were on interstate commerce, which was not under control of the state authorities. After hearing argument on this point the Commission overruled the demurrer, holding that the power given it by the Legislature authorizes it to fix rates on freights coming in on through bills of lading from other states, paying no attention to the allegation that such power is unconstitutional, because it confers authority on the Commission to regulate interstate commerce which is beyond the power of the State Legislature. The Commission holds that this is a matter for the Courts and that its business to carry out the manifest intention of the Legislature as expressed in the act creating the Commission.

Houston & Texas Central.—In the United States Circuit Court in Galveston, Tex., April 26, the Farmers' Loan

& Trust Co., trustee, filed a bill to foreclose the general mortgage. This mortgage was for \$18,500,000, and under it \$1,677,000 in bonds have been issued, the balance being reserved to provide for the prior mortgages. The present suit is understood to be auxiliary to the suit already begun to foreclose the first mortgage.

Joliet, Aurora & Northern.—The contract for grading this road from Aurora, Ill., to Plainfield, has been let to Chamberlain & Co., of Iowa, who have already begun work. The projected line is to run from Valparaiso, Ind., through Joliet to Aurora, and an extension beyond the last-named point is also proposed.

Kansas City, Memphis & Birmingham.—This company has been organized in Alabama for the purpose of building the proposed extension of the Kansas City, Springfield & Memphis road from Memphis to Birmingham, a distance of 250 miles. Surveys for the line are to be begun at once.

Kansas City, Springfield & Memphis.—This company has surveyed a line for a branch of its road from Willow Springs, Mo., eastward through Howell, Cannon and Carter counties, a distance of 60 miles. This branch will reach a large body of valuable timber.

Lake Shore & Michigan Southern.—The strike of the yardmen in Chicago ended on the afternoon of April 23, when the men returned to work and business was at once resumed. There seems to be some misunderstanding about the terms on which work was resumed, the men claiming that they were assured that the non-union switchmen, whose employment caused the strike, should be discharged, while the officers of the company say that they made no such promise. Both sides thus claimed a victory, but there has been no renewal of the strike, notwithstanding this uncertainty. There seems to have been a general impression among the men that the non-union men would be removed to other points, however it was produced, although no statement to this effect was made by any one authorized to speak for the company.

Long Island.—This company will soon begin work on an extension of the Locust Valley Branch from the present terminus at Locust Valley, N. Y., east to Oyster Bay, a distance of about 6 miles.

The report to the Railroad Commission for the quarter ending March 31 is as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Earnings	\$480,999	\$456,715	I. \$24,284	5.3
Expenses	384,070	376,806	I. 7,264	1.9
Net earnings	\$96,929	\$79,909	I. \$17,020	21.3
Other income	35,375	31,398	I. 3,977	12.8
Total	\$132,304	\$111,307	I. \$20,997	18.0
Charges	147,745	151,589	D. 3,844	2.3
Deficit	\$15,441	\$40,282	D. \$24,841	61.8

The usual dividend of 1 per cent. was paid. The quarter is generally one of very light earnings on this road, the surplus in the summer making up the deficit now reported.

Louisville, Evansville & St. Louis.—The United States Circuit Court in Chicago, April 23, granted final decree of foreclosure and sale against this road, appointing Mr. M. Jones, of Springfield, Ill., and Mr. W. F. Fishback, of Indianapolis, commissioners to make the sale, the date of which is fixed for June 9 next. The decree of foreclosure includes both the first mortgage for \$3,000,000, the second mortgage for \$1,000,000 and the income mortgage, but the sale will be made subject to the first mortgage of \$900,000 on the Evansville Branch, which has not been in default, and which will remain a lien upon that part of the property. Arrangements were completed some time ago for reorganizing the company, whose securities are owned chiefly in Boston.

Maine Central.—The statement for February and the two months to Feb. 28 is as follows:

	February, 1886.	1885.	Two months—1886.	1885.
Earnings	\$187,049	\$185,725	\$374,176	\$368,919
Expenses	134,909	133,159	269,377	279,876
Net earnings	\$52,140	\$52,566	\$87,779	\$89,043

For the two months the gross earnings increased \$5,257, or 1.4 per cent., and the expenses \$6,521, or 2.3 per cent., leaving a decrease of \$1,264, or 1.4 per cent., in net earnings.

Mexican Railroad Notes.—The following notes are from the *Mexican Financier* of April 17:

There is said to be some prospect of pushing forward the building of Huntington's International road from Monclova to Villa Lerdo on the line of the Central, tapping the rich Laguna country. Engineers are reported as in the field, making careful surveys. Sooner or later, this road is sure to be built.

We are unable, this week, from lack of space, to give the details of the new bill for the protection of railways and railway trains from assaults and offences of a serious nature. The bill provides most stringent penalties, and indicates the interest of the Government in this matter.

Milwaukee, Lake Shore & Western.—This company has filed with the Secretary of State of Wisconsin notice of its intention to build a branch of its main line at Hurley, southwest along the Gogebic iron range, a distance of 9 miles. The object of the branch is to reach several new mines.

Milwaukee & Northern.—Grading has been begun on both ends of the extension of this road, from the present terminus at Pike, Wis., to Iron Mountain, and the work is to be pushed. The bridging has also been begun. The principal bridge will be across the Menominee River, near Quinnesee, where a bridge 800 ft. long will cross the river, at an elevation of about 80 ft., and where 200 ft. of trestle, 77 ft. high, will be required in the approaches.

Minneapolis & Pacific.—The St. Paul *Pioneer Press* of April 23 says: "This morning Langdon & Lenton will begin work on the Minneapolis & Pacific. They will begin on the west bank of the Mississippi, opposite Anoka, and will complete 110 miles by Dec. 1. A large force of men and teams was sent to Anoka yesterday. The intention is to use the St. Paul & Northern Pacific's track between Anoka and Minneapolis. Connection with the latter road is to be secured by bridging the river at Anoka. It is now said the Minneapolis & Pacific will be operated in connection with the Minneapolis, Sault Ste. Marie & Atlantic road, as the same gentlemen are interested in both enterprises."

Missouri Pacific.—Traffic is proceeding without interruption on this road, and with a sufficient force of men. There have, however, been a few outbreaks of violence, which are charged to the strikers, including the stoppage of a freight train at Alvarado, Tex., and the wrecking of a freight train near Wyandotte, Kan., by the removal of the fastenings from several rails. On April 27 a number of men visited the yards at Atchison, Kan., and persuaded or forced a number of the workmen there to leave. Beyond these and one or two other slight outbreaks, there has been no trouble.

Bids have been received for the grading of the pre-

posed extension from Greenville, Tex., to Dallas, and it is expected that the contract will be awarded this week. The contractors will be required to begin work at once and to complete it by September 1. It is stated that the company has decided to build no more new roads in Texas this year.

Nashville, Chattanooga & St. Louis.—In the old suit brought against this company by the United States to recover interest accruing upon the bonds of the company held by the United States in trust for the Chickasaw Indians, between 1861 and 1866, the Supreme Court has reversed the decision of the Circuit Court and holds that the right of action in this case was not barred by the statutes of limitation and that the amount can be recovered.

New York, New Haven & Hartford.—Proposals will be received at the Vice-President's office in New Haven, Conn., until May 6, for furnishing materials and erecting a new passenger station at New Britain. Plans and specifications can be seen at the Chief Engineer's office in New Haven.

Niagara Falls & Whirlpool.—The surveys for this projected line at Niagara Falls have been completed, and the engineer reports that a much better line than expected has been found. The principal difficulty will be in securing the right of way, the property to be used being held by the owners at a very high figure.

Norfolk & Western.—This company's statement for March and the three months to March 31 is as follows:

	March.		Three months.	
	1886.	1885.	1886.	1885.
Earnings.....	\$277,307	\$220,413	\$718,002	\$645,932
Expenses.....	156,375	134,245	435,072	384,514
Net earnings....	\$120,932	\$86,171	\$282,930	\$261,438
Per cent. of exps...	56	61	61	59

For the three months the gross earnings increased \$72,050, or 11 per cent., and the expenses \$53,558, or 13 per cent., leaving a gain in net earnings of \$21,492, or 8 per cent. Taxes are included in expenses.

Northern Central.—This company's statement for March and the three months to March 31 is as follows:

	March		Three months	
	1886.	1885.	1886.	1885.
Earnings	\$460,147	\$483,360	\$1,291,231	\$1,276,625
Expenses	261,929	254,955	775,445	743,669
Net earnings	\$198,218	\$228,405	\$515,786	\$532,956

For the three months the gross earnings increased \$14,606, or 1.1 per cent., and the expenses \$31,776, or 4.3 per cent., the result being a decrease of \$17,170, or 3.2 per cent., in net earnings.

Northern Pacific.—This company has decided to build a branch from its main line at Helena, Mont., to the mines at Red Mountain, a distance of 15 miles. The company has also under consideration the question of building several important branches in Montana, including the line from Helena to Ft. Benton, 150 miles, from Missoula up the Bitter Root Valley, 60 miles, and from Drummond to Phillipsburg, 24 miles, but no decision has yet been reached as to beginning these lines this year.

This company's statement for March and the nine months of the fiscal year, from July 1 to March 31, is as follows:

	—March—		—Nine months—	
	1886	1885	1885-86.	1884-85
Earnings.....	\$858,116	\$91,612	\$8,675,956	\$8,442,877
Expenses.....	449,055	44,474	4,413,153	4,565,153

For the nine months the gross earnings increased \$223,079, or 2.8 per cent., and the expenses decreased \$152,000, or 3.3 per cent., the result being a gain in net earnings of \$355,079, or 9.9 per cent. The fixed charges for the nine months this year amounted to \$4,424,024, or \$161,221 in excess of the net earnings. Construction expenditures for March were \$81,589.

Old Colony.—It is reported that this company will build an extension of its Plymouth line southward to Manomet on the Cape Cod Division. The people along the line have offered to give the company the right of way and an additional bonus. The extension would give the Old Colony a second line from Boston to a connection with the Cape Cod line.

Pacific Railroads and the Government.—The committee of the House of Representatives on Pacific railroads has decided to report favorably to the House the bill providing for an extension of the debts of the Pacific railroads. This bill, in substance, provides that to the principals of the subsidy bonds issued is to be added the interest paid and to be paid by the United States to the time of maturity of those bonds. From this amount is to be deducted all the payments made by the companies up to Oct. 1, 1886, and, also, the value of existing sinking funds. After these deductions are made, interest at 3½ per cent. from the average date of maturity of the bonds, to Oct. 1, 1921, is to be added, and the whole amount thus obtained is to be made payable by the companies in 140 equal half-yearly installments, beginning with April 1, 1887. This bill thus provides a method of ascertaining the total amount due the United States by the companies, and distributes the payment of that amount over a period of 70 years. The approximate amount which the companies would have to provide under this bill, should it pass, would be \$3,757,500 yearly.

Pennsylvania.—The grading of the Schuylkill Division from the present terminus at Hamburg, Pa., through Pottsville to New Boston, is now nearly completed, the principal work still unfinished being the heavy cuts at Port Clinton and Schuylkill Haven south of Pottsville and the St. Clair tunnel between Pottsville and New Boston. Tracklaying will be begun at both ends of the line about May 1. Surveys are being made for the extension from New Boston northward to Tomhicken, where connection will be made with the Sunbury, Hazleton & Williamsport branch, and through that line with the North and West Branch road to Williamsport and Pittston. The length of this extension to Tomhicken will be about 26 miles.

This company's statement for March shows for all lines east of Pittsburgh and Erie, as compared with March, 1885, an increase in gross earnings of \$266,481; an increase in expenses of \$121,810, and an increase in net earnings of \$144,671. For the three months to March 31, as compared with the corresponding period in 1885, the same lines show an increase in gross earnings of \$834,270, an increase in expenses of \$341,517, and an increase in net earnings of \$492,753.

Carrying out these changes, we have the following statement:

	March.		Three months.	
	1886.	1885.	1886.	1885.
Earnings	\$3,901,855	\$3,635,374	\$10,872,857	\$9,988,587
Expenses.....	2,596,075	2,474,265	7,748,142	7,006,625
Net earnings.....	\$1,305,780	\$1,161,109	\$3,124,715	\$2,981,962
Per cent. of exps....	66.5	68.1	67.6	70.1

All lines west of Pittsburgh for the three months of 1886 show a deficiency in meeting all liabilities of \$358,493, being

a decreased deficiency of \$73,772, as compared with the corresponding period last year. The total net gain on all lines was thus \$616,525 for the quarter.

Track has been laid on this company's Long Beach Railroad from Mannahawken, N. J., on the Tuckerton Railroad, eastward to the crossing of Barnegat Bay at the Cedar Bonnet, a distance of 5 miles. Grading is in progress on Long Beach from Barnegat inland, southward to Beach Haven, a distance of 15 miles, and the intention is to complete this line in time for summer travel.

Peoria, Decatur & Evansville.—The following statement is published for February and the two months to Feb. 28:

	February.		Two months	
	1886.	1885.	1886	1885.
Gross earnings	\$60,488	\$55,531	\$115,408	\$116,807
Expenses.....	27,801	30,371	57,137	63,160
Net earnings.....	\$32,686	\$25,160	\$58,270	\$53,646

For the two months the gross earnings decreased \$1,399, or 1.2 per cent., and the expenses \$6,023, or 3.2 per cent., leaving a gain of \$4,624, or 8.6 per cent., in net earnings.

Philadelphia & Reading.—It is again reported that Mr. Gowen has formed a syndicate, composed largely of Pittsburgh people, to pay off the arrears on the general mortgage and take charge of the reorganization. The rumor, however, seems to be nothing more than a revival of former stories, and there is no evidence that Mr. Gowen has so far secured any money.

The Drexel syndicate state that they have no additions to its membership and no changes in its intentions; but that it purposes to carry out the programme already announced.

At the sale of the bonds pledged as collateral for the New Jersey Central floating debt, in New York, April 28, Mr. Wharton Barker bought \$1,000,000 first consolidated 5s and \$100,000 second consolidated 5s, the remaining \$1,900,000 second consols being withdrawn for the day. Mr. Barker is very strongly opposed to the syndicate plan of reorganization, and this purchase strengthens his position as representative of the holders of consolidated 5s.

The statement of the Receivers for March, 1886, as compared with the same month in 1885, shows:

An increase in gross earnings of.....	\$403,524
An increase in expenses of.....	337,493

An increase in net earnings of.....\$66,031

The four months ending March 31, 1886, as compared with the same period in 1885, show an increase in gross earnings of.....\$1,141,496

An increase in expenses of.....810,530

An increase in net earnings of.....\$330,966

This includes the earnings of both (railroad and coal) companies. The detailed statement has not yet come to hand.

A telegram from Reading says: "Of the \$750,000 worth of new work, such as passenger, coal and cattle cars, and engines, ordered by the Philadelphia & Reading Railroad Receivers, \$600,000 worth was assigned to the company's shops in this city. The company's one thousand employees asked that they be allowed to do the work by the day, instead of working by contract at a fixed price per car. The officials informed them that if they persisted in their demand, the work would in all probability be done at other places, in which event half the present force would be discharged. The employees will hold a meeting to consider the matter."

Prattsburg & Kanona.—This company has been organized to build a railroad from Prattsburg in Steuben County, N. Y., southward to Kanona on the Rochester Division of the Erie. The road will be about 12 miles long.

Richmond & Danville.—A Richmond dispatch of April 27 says that the Circuit Court in that city has granted a preliminary injunction to restrain the Richmond & West Point Terminal Co. from transferring to the Richmond & Danville Railroad Co. the stock which it owns in the Charlotte, Columbia & Augusta, the Columbia & Greenville and the Western North Carolina roads. The suit is brought by James J. Gray and Gustavus Millhiser, of Richmond, but the grounds for the action are not stated.

General Manager E. B. Thomas has issued a general order which reads as follows:

"In order to remove the obstructions to traffic caused by breaks of gauge, it has been agreed by the railroads south of the Potomac and Ohio rivers, having now the 5-ft. gauge, to change to a gauge of 4 ft. 9 in., on or about June 1.

"In conformity with this agreement the changes will be made upon the roads of these companies as follows:

"Roads operated by the Richmond & Danville Railroad Co.: Between West Point and Danville, Va., May 27, 1886; between Danville and Atlanta, Ga., and Company Shops and Salem, N. C., June 1, 1886; between Company Shops and Goldsboro, N. C., as soon after June 1 as the cars parked for change can be moved to Company Shops.

"Western North Carolina Railroad: Between Salisbury and Paint Rock, N. C., May 26, 1886; Murphy Branch, May 28, 1886.

"Charlotte, Columbia & Augusta, and Columbia & Greenville roads: Between Statesville and Charlotte, N. C., May 26, 1886; between Charlotte and Augusta, Ga., June 1, 1886; C. & G. main line and branches, June 8, 1886.

"The detailed instructions upon each division will be issued by its Superintendent, in accordance with the conference and understanding previously had with him, and sufficiently in advance of the specified days to be thoroughly understood by the officers and men of the Roadway Department, and to have all necessary tools and supplies in place.

"On the dates named no commercial business or other telegrams regarding matters other than train movements or business referring to change of gauge must be received or forwarded to the companies' operators on lines making change—the entire control of the wires being necessary to successful results in the work on hand.

"All trains failing to make designated terminals by 3 a. m. of day of change must take nearest siding, and remain there until moved by order of the Superintendent.

"On June, the headquarters of the General Manager will be at Charlotte, N. C., to which point all telegrams and communications to him, referring to the change of gauge, will be addressed on that day.

"In view of the magnitude and importance of the work, it is to be impressed on all officers and employees of the companies that very unusual energy must be employed to make the change promptly and successfully, and it is intrusted to them with confidence in their zeal and loyalty to the interests of the companies."

St. Joseph & St. Louis.—This road was transferred by the Wabash Receivers to the representatives of the company, under order of the Court on April 24. The road extends from North Lexington, Mo., to St. Joseph, 82 miles, and has been operated by the Wabash under lease. The present company which acquired the property through foreclosure, has no bonded debt, the property being entirely represented by stock. It is proposed to mortgage the property and issue bonds to an amount sufficient to put the line in good condition and purchase equipment. At the foreclosure sale of the Wabash this week the leasehold interest of that company in the road was purchased by the President of this company, thus removing all claims against the property.

St. Louis, Alton & Terre Haute.—In the suit brought by this company against the Indianapolis & St. Louis, the Cleveland, Columbus, Cincinnati & Indianapolis, the Lake Shore & Michigan Southern, the Pittsburgh, Fort Wayne & Chicago, the Pennsylvania Railroad Co. and the Pennsylvania Co., the United States Supreme Court has given its decision. The suit was brought to recover back rental accruing under the old lease of the road due the Indianapolis & St. Louis Co., the other companies named having jointly guaranteed the lease. In the Circuit Court a decree was ordered in favor of this company for \$664,875, and appeals were taken by all the parties to the suit. The Supreme Court now reverses this decision so far as it relates to all the companies except the Indianapolis & St. Louis, and affirms it as against the company. The case is remanded to the Circuit Court with directions to dismiss the bill, except as against the Indianapolis & St. Louis, and to carry out the decree as modified. As soon as the appeal was taken the case has been practically settled and a new lease entered into, the only question remaining being as to the liabilities of the companies which guaranteed the lease, and that question is now decided finally in favor of the guaranteeing companies.

St. Louis, Fort Scott & Wichita.—Mr. Charles Moran, a holder of securities of this company, has obtained in the United States Supreme Court an injunction to restrain the company from issuing new bonds under the mortgage executed in 1882 in excess of \$15,000 per mile of completed road.

San Antonio & Aransas Pass.—Rapid progress has been made on this road recently, and the rails are reported laid to Beeville, Tex., 29 miles southeast from the last point noted, and 81 miles from San Antonio. At Beeville the branch to Corpus Christi will diverge from the main line.

Securities on the New York Stock Exchange.—The Governing Committee of the New York Stock Exchange has placed the following securities on the lists:

Albany & Susquehanna, \$117,000 additional first consolidated mortgage bonds.

Rome, Watertown & Ogdensburg, \$837,000 additional consolidated bonds, making the total amount listed \$6,337,000.

Toledo, Ann Arbor & North Michigan, \$1,260,000 first mortgage bonds.

Sinnemahoning Valley.—Work has been begun on an extension of this road from its present terminus at Austin, Pa., westward to Costello, a distance of 4 miles. The line is built chiefly to reach timber lands.

Southern Pacific.—Grading is now actively in progress on the new branch to the Yosemite Valley. This branch leaves the main line at Berenda in the San Joaquin Valley, and will, it is expected, be completed eastward to Raymond, 25 miles, in June. It is not yet decided whether any further extension will be made this year.

The United States Supreme Court has reversed the decision of the lower court and has remanded to the California courts the suit brought by the state of California against this company to recover certain taxes assessed upon the road.

It is now announced that in consequence of the difficulties in relation to the right of way, the new coast branch for this road will leave the main line at San Fernando, Cal., instead of Newhall. The line has been located and a large force is already at work, with the intention of completing during the summer the road from San Fernando through Huemene to San Buenaventura, a distance of 60 miles. Most of the work on this section will be light, the only difficult grading required being some rock cutting and the short tunnel in the Santa Susanna Pass. From San Buenaventura the road will be continued up the coast to Santa Barbara, and thence to a junction with the Northern Division of the road.

South Pacific Coast.—This company has just completed the work of laying track on a branch extending from its line at Campbell, Cal., eastward to the quicksilver mines at New Almaden, a distance of 9 miles. The branch is to be continued some 15 miles further to Gilroy.

Springfield & New London.—The final settlement with this company has been made, the stock purchased by the New England Co. having been paid for and transferred. The New York & New England now has a lease of the road, and also owns a majority of the stock, most of which has heretofore been held by the city of Springfield.

Texas & Pacific.—The following statement of net earnings and interest charges for 1885 (not official) has been published:

	Net earnings.	Interest.	Sur. or Def.
Rio Grande Division.....	\$26,000	\$791,000	D. \$765,000
New Orleans Division.....	213,007	403,300	D. 190,293
Eastern Division.....	863,000	781,680	S. 81,320

Total.....\$1,102,000 \$1,975,880 D. \$873,880

"The land sales in 1883 were 178,531 acres for \$626,404, equal to \$3.50 per acre. This money is used for the retirement of the land grant and income bonds, which are a first mortgage on the lands and a third mortgage on the Eastern Division of the road."

The Reorganization Committee, of which General I. J. Wistar is Chairman and C. E. Satterlee is Secretary, met in Philadelphia, April 27, and unanimously agreed upon the following plan of reorganization, which will be officially published in a few days:

All property—except land grant lands—to be purchased under foreclosure for a new corporation, whose capital stock will be the same amount as that of the present company, the stockholders receiving for every three shares of old stock one new share, with the optional right to buy another for \$15.

The floating debt to be settled for in new stock at \$20 per share. The new company to make one new 50-year gold 5 per cent. mortgage for \$40,000,000, of which \$23,000,000 to be known as series A, bearing obligatory interest, and \$17,000,000 as series B, with interest payable as earned, noncumulative; but no new lien can ever be interposed between the two series.

Consolidated bonds to receive 100 per cent. of series A and 20 per cent. series B.

New Orleans Division bonds to receive 55 per cent. of series A and 45 per cent. series B.

Rio Grande Division bonds to receive 35 per cent. of series A and 65 per cent. series B.

Terminal bonds to receive 25 per cent. of series A and 75 per cent. series B.

The land grant lands to be purchased and administered by the bondholders, with the assent and aid of the Committee.

The plan involves an annual obligatory interest of \$1,115,000, and conditional interest of \$700,000, supplies about \$3,000,000 in cash for expenses and repairs (if the stockholders take the new stock), and, it is claimed, preserves all alliances, tonnage and pools.

A meeting of holders of income bonds was held in New York April 26, to consider a proposition made by the company to the holders of these bonds to the effect that they take possession of the land grant and surrender their present lien, a third mortgage, on the Eastern Division. The proposition was not well received, a majority of them being opposed to it, but a committee was appointed to consider the best course of action and report to a future meeting.

West Shore.—The Utica (N. Y.) *Herald* of April 27 says: "A branch track is nearly completed at Kirkville, Onondaga County, which is to connect the Central Hudson and the West Shore roads. It is the intention to transfer to the West Shore at this point the through ocean freight coming from the west on the Central. This transfer is not made at Buffalo, because west of Syracuse, for the greater part of the way, the West Shore is a single track road. East of Syracuse, however, it is a double track. The advantages of the transfer of freight at Kirkville are obvious. The Rome and Albany detours are avoided, thus saving fully an hour's time, and besides, freight is landed at the Weehawken dock, where it can be more directly loaded upon ocean steamers, than if it had passed over the Hudson River road."

Wisconsin Central.—The Chicago *Inter-Ocean* of April 26 says: "General Manager Finney, of the Wisconsin Central Road, says that the first through train between Chicago and St. Paul will be run over the road June 15. It is the company's intention to start in with a fast train service and the time schedule will provide for a 13-hour run. The recent heavy purchases of real estate near Taylor street and the probable passage of the Bridwell lot bill with amendments in the Senate, solve the problem of its terminal facilities. There are some legal complications regarding street crossings, but it is believed that they will be easily surmounted."

This company's entrance into Chicago has been secured under the charter of the Chicago & Great Western Co. A suit has just been begun to prevent any transfer of property by that company. It is brought by parties who hold some \$400,000 bonds issued by the Chicago & Great Western Co. some 13 years ago, when it was first organized, and who now want to enforce their lien. No interest has been paid on these bonds since 1873, and they were not considered of value until the company was revived recently.

Yadkin.—It is stated that surveys are to be begun for this projected line, which is to run from Salisbury, N. C., northward, through the Yadkin Valley, to Mt. Airy. A branch to Martinsville or Danville, Va., is also proposed.

ANNUAL REPORTS.

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Fort Wayne, Cincinnati & Louisville.

This company owns a line from Fort Wayne, Ind., southward to Connellsville, 104 miles, with a branch from Newcastle to Rushville, 24 miles, a total of 128 miles. The following statement has been published for the year ending Dec. 31.

The earnings for the year were as follows:				
	1885	1884.	Inc. or Dec.	P. c.
Earnings.....	\$230,650	\$246,396	D. \$15,746	6.4
Expenses.....	205,719	223,082	D. 17,363	7.8
Net earnings.....	\$24,931	\$23,314	I. \$1,617	7.0
Gross earn per mile...	1,502	1,825	D. 123	8.4
Net.....	105	182	I. 13	7.0
Per cent. of expenses.....	89.2	90.5	D. 1.3	...

The funded debt consists of \$100,000 debentures, on which the interest was \$7,000, leaving a surplus of \$17,931 for the year.

Panama.

This company owns a line across the Isthmus of Panama from Colon (Aspinwall) to Panama, 48 miles. The statements given below are for the year ending Dec. 31.

The earnings for the year were as follows:				
	1885.	1884.	Inc. or Dec.	P. c.
Passenger.....	\$383,891	\$443,087	D. \$59,096	13.3
Freight.....	2,522,548	2,653,079	D. 170,731	6.3
Mail, etc.....	32,488	26,104	I. 6,384	24.3
Total.....	\$2,938,827	\$3,162,330	D. \$223,503	7.1
Expenses.....	2,655,273	2,743,377	I. 911,896	52.3
Net earnings.....	\$283,554	\$1,418,953	D. \$1,135,399	79.9
Gross earn. per m.	61.226	65.882	D. 4.656	7.1
Net.....	5.907	29.502	D. 23.595	79.9
Per cent. of exps.....	90.4	85.1	I. 5.3	...

The expenses last year were made up of \$2,591,614 for transportation and repairs, and \$64,209 miscellaneous.

The income account is as follows:

Net earnings, as above.....	\$283,554
Other receipts.....	329,096
Total income.....	\$612,650
Interest on debt.....	\$129,006
Subsidy paid and subsidy bonds redeemed.....	92,000
Miscellaneous payments.....	20,034
Dividends, 10 per cent.....	700,000
Deficit for the year.....	\$1,241,040
Surplus, Jan. 1, 1885.....	\$628,390
Surplus, Dec. 31, 1885.....	\$1,076,556

The road carried last year 567,694 passengers and 269,497 tons freight, against 515,520 passengers and 287,243 tons in 1884; an increase of 10.1 per cent. in passengers and a decrease of 8.6 per cent. in freight.

The decrease of earnings for 1885 is shown by the report to have occurred from the loss of traffic and sundry sources

of income, caused by the political troubles on the Isthmus in March and April, 1885. The large increase in operating expenses was caused by the entire destruction of the company's wharves and freight sheds at Colon, by the fire of March 31, 1885.

The falling off of through freight to Europe from the West Coast ports is attributable to the fact that the Pacific Steam Navigation Co., from May 5 to June 15, received no European freight from the South American ports for the 10 steamers that arrived in that period. The report says:

"The past year has been one of the most eventful in the history of your company, caused by the political disturbances on the Isthmus. Taking every element into consideration, it still shows your property at Aspinwall in better condition than previously, owing to the improvements in rebuilding wharves and freight sheds. The steamship service remains as in 1884, with the addition of a small line of two steamers to New Orleans direct, which carry the United States mails and make bi-monthly trips."

Cumberland Valley.

This company owns a line from Harrisburg, Pa., to Williamsport, Md., 82.2 miles. It leases (and chiefly owns) the Dillsburg & Mechanicsburg, a branch to Mechanicsburg, Pa., 7.7 miles; the Martinsburg & Potomac, from Williamsport to Martinsburg, W. Va., 12 miles, and the Southern Pennsylvania, a branch to Richmond, Pa., with spur to Mercersburg, 21.4 miles. It owns, but does not lease, the Mont Alto road, from Mont Alto Junction to Waynesboro, Pa., 18.3 miles.

The capital account is as follows:

First preferred stock.....	\$241,900
Second preferred stock.....	243,000
Common stock.....	1,292,950
Funded debt.....	270,500
Dividends and interest due.....	41,104
Profit and loss.....	784,730
Total.....	\$2,874,274
Road and equipment.....	\$1,991,826
Trustees of contingent fund.....	588,925
Materials on hand.....	26,297
Balance of accounts.....	178,428
Cash.....	88,798
Total.....	2,874,274

The funded debt includes \$161,000 firsts and \$109,500 seconds. The contingent fund represents chiefly surplus invested in the leased lines. There was no change in stock or bonds last year.

The earnings of the main line were as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Freight.....	\$397,157	\$443,392	D. \$46,235	10.4
Passengers.....	252,675	273,381	D. 20,706	7.6
Mail and express.....	28,607	26,692	I. 1,915	7.1
Miscellaneous.....	20,954	24,867	D. 3,913	15.7
Total.....	\$699,393	\$768,332	D. \$68,939	9.0
Expenses.....	443,582	554,995	D. 111,412	20.1
Net earnings.....	\$255,811	\$213,338	I. \$42,473	19.9
Gross earn. per mile.....	8.508	9.374	D. 869	9.0
Net.....	3.112	2.595	I. 517	19.9
Per cent. of expenses.....	63.4	72.2	D. 8.8	

The total gross earnings of the main and leased lines were \$769,647, a decrease of \$74,868, or 8.9 per cent., from the previous year.

The result of the year was as following:

Net earnings, as above.....	\$255,811
Interest on bonds.....	\$21,640
State taxes.....	12,085
Real estate and construction.....	20,297
Dividends, 8 per cent.....	142,228
Surplus for the year.....	\$50,561

From this surplus there was \$17,536 invested in Shenandoah Valley bonds and \$3,538 in Gettysburg & Harrisburg bonds, in pursuance of the traffic contracts with those companies.

The traffic for the year was as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Pass. train-miles	292,318	298,405	D. 6,087	2.1
Freight	318,277	342,118	D. 23,841	9.9
Total loco. miles	605,595	650,523	D. 44,577	6.9
Passengers carried	589,344	689,218	D. 99,784	14.5
Passenger miles	11,342,502	13,052,802	D. 1,710,300	13.1
Tons freight carried	607,118	643,352	D. 36,234	5.6
Ton-miles	24,648,928	26,622,218	D. 1,973,290	7.4

Av. train load:

Passengers, No.....	38.8	43.7	D. 4.9	11.2
Freight, tons.....	112.9	110.0	I. 2.9	2.6
Average rate:				
Per passenger-mile.....	2.400 cts.	2.310 cts.	I. 0.090	6.5
Per ton-mile.....	1.011	1.063	D. 0.052	3.2

The earnings per passenger train-mile last year were 96.22; per freight train-mile, 181.95 cents. The average passenger journey was 19.2 miles; the average freight haul, 40.6 miles. The passenger traffic includes the branches; the freight, the main line only.

The earnings of the leased and controlled lines were:

	Dills. & Mech.	Mart. & Pot.	So. Penn.	Mt. Alto.
Earnings	\$23,647	\$22,563	\$24,044	\$18,955
Expenses	18,194	21,596	20,874	20,400
Net earnings	\$5,453	\$967	\$3,170	\$8,555
Gross earn. p. mile.	3.071	1.880	1.124	1.638
Net	708	81	148	1,000
Per cent. of exps.	76.9	95.7	88.8	107.7
Tons fr't carried.....	61,970	42,516	26,035	21,474

* Deficit.

Improvements were made on all the lines. Of the total tonnage of the leased lines (155,170) nearly all, or 151,991 tons, came from or passed to the main line.

During the year a building owned by the company in Harrisburg was converted into a new passenger station. Improvements were made in stations at several other points on the line. Five piers and an abutment of the bridge over the Susquehanna were rebuilt, completing the renewal of that structure. Interlocking switch and signal apparatus was erected at the junction with the Northern Central at Bridgeport and at the Western Maryland crossing at Hagerstown. There were built in the shops 5 passenger, 1 combination and 2 express cars and a derrick car.

Philadelphia, Wilmington & Baltimore.

This company operates the Philadelphia, Wilmington & Baltimore, main line, 94.99 miles, with 27.48 miles of branches; the Philadelphia & Baltimore Central, 78.49; the Delaware Railroad and branches, 99.97; the Queen Anne & Kent, 25.96; the Delaware & Chesapeake, 54.29; the Cambridge & Seaford, 27.25; the Delaware, Maryland & Virginia, 97.60; a total of 505.93 miles of road. The company also owns a branch from Perryville, Md., to Port Deposit, which is leased to the Columbia & Port Deposit Co. The report is for the year ending Oct. 31.

The Delaware, Maryland & Virginia road was added during the year, having been worked from July 1, four months. It includes a line from Harrington, Del., to Reh-

both, 43.64 miles, and one from Georgetown Junction, Del., to Frankfort City, Va., 53.96 miles, a total of 97.60 miles.

The Philadelphia & Baltimore Central road is owned through ownership of the entire stock. It includes the former West Chester & Philadelphia road. The Delaware road is leased (this company also owning a majority of the stock) for 30 per cent. of the gross earnings. The Queen Anne & Kent and the Delaware, Maryland & Virginia are controlled and operated, this company owning a majority of stock of each. The Dorchester & Delaware and the Cambridge & Seaford roads are owned through ownership of their entire stock.

The equipment includes 128 locomotives; 189 passenger, 38 baggage and 20 express cars; 1,080 box, 31 stock, 288 gondola, 244 platform, 57 lime and 39 caboose cars; 6 tool, 5 derrick, 29 stone and wood, 17 flat and 8 work train caboose cars; 4 snow-sweepers; 104 hand and 119 push cars.

The general account, condensed, is as follows:

Capital stock.....	\$11,819,350
Funded debt.....	3,636,067
Accounts and balances, inc. January dividend.....	1,114,686
Profit and loss, balance.....	1,369,985
Total.....	\$17,940,088
Road and equipment.....	\$14,143,390
Stocks and bonds.....	1,777,319
Sinking funds.....	260,000
Fuel and materials.....	374,027
Accounts receivable.....	751,714
Cash.....	634,238
Total.....	17,940,088

The funded debt includes \$2,500,000 registered 6s; \$1,000,000 registered 5s; \$76,667 ground rents and \$60,000 ten-year notes, due 1887. The only change during the year was the retirement of the last remaining convertible bond of 1884, for \$1,000, which was exchanged for stock.

The earnings for the year were as follows:

	1884-85.	1883-84.	Inc. or Dec.	P. c.
Passengers.....	\$2,986,203	\$2,939,103	I. \$47,100	1.6
Freight.....	2,381,222	2,566,583	D. 185,361	7.8
Mail and express.....	275,925	280,363	D. 4,438	1.6
Rents.....	35,178	34,274	I. 904	2.6
Total.....	\$5,678,588	\$5,820,323	D. \$141,735	2.4
Expenses.....	3,889,772	3,965,145	D. 75,373	1.9
Net earnings.....	\$1,788,816	\$1,855,178	D. \$66,362	3.6
Gross earn. per mile.....	11.995	14.223	D. 2,228	15.8
Net.....	3.778	4.533	D. 755	16.8
Per cent. of exps.....	68.5	69.1	I. 0.4	...

The decrease in earnings was wholly in freight over the main line. The reduction in earnings per mile was due to the addition of a line with light average earnings.

The income account, showing the earnings of each line separately, is as follows:

	Earnings.	Expenses.	Net or deficit.
Phila., Wil., & Balt.....	\$4,126,320	\$2,583,638	N. \$1,542,682
Delaware R. R.....	644,117	514,870	N. 129,247
Queen Anne & Kent.....	29,144	46,465	D. 17,321
Del. & Chesapeake.....	69,784	110,705	D. 40,921
Cambridge & Seaford.....	16,130	34,290	D. 18,160
Del. Md. & Va. (4 mos.).....	64,283	52,684	N. 11,599
Phila. & Balt. Central.....	728,810	547,011	N. 181,799
Total.....	\$5,678,588	\$3,889,772	N. \$1,788,816
Interest on Investments.....			59,873
Delaware R. R., excess over fixed charges.....			62,501
Total net income.....			\$1,911,190

Interest on bonds.....	\$11,000
Rental of leased roads.....	386,634
State taxes on stock.....	47,866
Advances and sundry charges.....	68,720
Dividends, 8 per cent.....	945,548
Balance, surplus for the year.....	\$251,503
Surplus, Nov. 1, 1884.....	\$1,229,699
Less depreciation, old accounts, etc.....	180,987
Total.....	1,118,482

Total surplus, Oct. 31, 1885.....\$1,369,985

The earnings of the Philadelphia, Wilmington & Baltimore proper were \$33,692 gross and \$12,596 net per mile, against \$35,520 and \$13,177 in 1884.

ests of the country for the past year, your board has reason to congratulate the shareholders upon the results attained from the operation of your system."

South Carolina:

This company owns a line from Charleston, S. C., to Augusta, Ga., 187 miles, with branches from Branchville, S. C., to Columbia, 68 miles; Kingville to Camden, 38 miles, and Ten-mile to Phosphate Mine, 3 miles, making 246 miles in all. The report just issued is for the year ending Dec. 31.

The company also owns the Barnwell Railroad, 9 miles, but its operations are not included in the statements.

The equipment consists of 44 locomotives; 34 passenger, 1 sleeping, and 5 baggage, mail and express cars; 804 box, 14 stock, 158 flat, and 23 caboose cars; 2 officers' and pay cars, 1 commissary, 1 derrick, and 4 shanty cars.

The general account, condensed, is as follows:

Capital stock	\$4,204,160
Funded debt	8,834,571
Bills and accounts payable	278,068
Interest account	129,347
Total	\$13,446,145
Road and property	\$12,572,236
N. Y. & Charleston W. & S. N. Co.	446,879
Barnwell Railroad	70,616
Accounts and balances	135,042
Materials	85,370
Cash	127,067
Income and profit and loss	8,915
Total	13,446,145

The funded debt includes \$656,570 old prior lien bonds; \$4,510,000 first consolidated 6s; \$1,130,000 second consolidated 6s, and \$2,538,000 income 6s. During the year \$5,000 received from the trustees under the consolidated mortgage, and \$15,795 from sale of land, were applied to payment of prior lien bonds. The trustees hold to provide for these bonds \$490,000 first consols, \$170,000 second consols and \$14,146 cash. The company has in its treasury \$200,000 of its second consols; \$462,000 of its income bonds; \$90,000 Barnwell Railroad bonds; \$75,000 bonds and \$350,700 stock (a controlling interest) of the New York & Charleston Warehouse & Steam Navigation Co.

The earnings for the year were as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Freight	\$815,975	\$893,859	D. \$77,884	8.7
Passenger	279,144	279,770	D. 626	0.2
Mail and express	35,013	34,411	I. 602	1.8
Miscellaneous	21,769	25,252	D. 3,483	14.1
Total	\$1,151,841	\$1,233,992	D. \$82,151	6.6
Expenses	\$23,084	\$50,567	D. 26,883	3.2
Net earnings	\$928,757	\$883,425	D. \$45,332	5.1
Gross earn. per mile	4.682	5.013	D. .331	6.6
Net	1.31	1.556	D. .246	14.2
Per cent. of exps.	71.5	69.0	I. 2.5	...

Renewals included 500 tons of steel rails and 87,822 new ties. The usual renewals of buildings and bridges were made and the piers for the new bridge over the Savannah at Augusta were completed. There were 3,628 ft. of new sidings built.

The sources of freight (including express) earnings were from business as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Between:				
Charleston and Augusta and beyond	\$192,956	23.3	\$228,468	25.2
Charleston and Columbia and beyond	189,921	22.5	239,856	26.4
Charleston and local stations	382,033	43.6	381,970	39.9
Local stations	87,753	10.6	77,546	8.5
Total	\$829,663	100.0	\$907,840	100.0

The earnings of the Barnwell Railroad (not included above) were \$11,591; the expenses (including taxes) were \$8,385, and the net earnings \$3,206. The net earnings are applied toward payment of interest on the bonds, which are held by the South Carolina Co.

The traffic for the year was as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Passenger	392,029	392,970	D. 941	0.2
Freight	554,930	544,063	I. 10,867	2.0
Service and switch	290,147	317,495	I. 81,652	25.7
Total	1,346,106	1,254,528	I. 91,578	7.3
Passengers carried	248,541	273,655	D. 25,114	9.2
Tons freight carried	377,850	390,257	D. 12,407	3.2
Ton-miles	40,091,676	42,881,613	D. 2,789,937	6.5
Av. rate:				
Per ton-mile	2.04 cts.	2.12 cts.	D. 0.08 ct.	3.8
net	0.55	0.67	D. 0.12	17.9

The receipts of leading articles at Charleston were: 228,229 bales cotton, 25,835 barrels flour, 414,633 bushels grain, 71,790 barrels naval stores, and 10,040 head live stock. The total movement of fertilizers was 93,277 tons, the largest ever reported.

The average receipts and cost per train-mile were, in cents:

	1885.	1884.	1885.	1884.
Earnings	80.16	80.00	147.00	164.30
Expense	55.89	57.40	109.13	115.00
Net earnings	24.27	22.60	37.87	49.30

Passenger trains last year cost 28.70 cents per mile for repairs and renewals and 27.19 for other expenses. Freight trains cost 34.00 for repairs and renewals and 75.13 cents for other expenses. Locomotive service cost 14.74 cents per mile run.

The income account, condensed, is as follows:

Net earnings, as above	\$328,157
Interest and dividends received	30,369
Total	\$358,526
Interest on bonds and loans	382,543
Deficit for the year	\$24,117
Balance from previous year	15,848
Debit balance, Dec. 31, 1885.	\$8,269

President Talmadge's report says: "From the above statement it will be seen that the net receipts of the company for the year fell short of meeting the interest accruing during that period by the sum of \$24,117."

"All expenditures upon the property during the year have been charged to operating expenses. Included therein have been the cost of completing the stone piers of the Augusta bridge and the building of 3,900 ft. of new trestle, completing the Wateree trestle, which, with the ordinary repairs of bridges and trestles, have made the cost of maintaining bridges amount to \$30,868 for the year."

"The superstructure of the Augusta bridge will be completed during 1886, after which the expenditure upon bridges and trestles can be very largely reduced."

"The sum of \$4,256 expended by the Machinery Department in preparation for the change of gauge have also been included in the operating expenses of the year."

"This change of gauge from 5 ft. to 4 ft. 9 in. is to be made about June 1, 1886, by all our connecting roads, and

must therefore be made by the South Carolina Railway Co. also."

"The expenditures incident thereto will prevent any reduction of the expenses of 1886 as compared with 1885, but the substitution of 10 new and more powerful locomotives in place of a like number of old and small ones, which has been arranged for, will allow a considerable reduction to be made in the cost of maintaining locomotives and will also decrease the cost of transportation."

"It may therefore be safely assumed that even with the gross earnings, as small as they have been during 1885, there will be no deficiency in meeting all accruing payments after 1886."

"During the year 1885 the New York & Charleston Warehouse & Steam Navigation Co. has purchased the wharves and warehouses in Charleston known as Adger's wharves, and a controlling interest in the New York & Charleston Steamship Co., which owns two of the three steamers forming the regular semi-weekly line between Charleston and New York. These acquisitions have largely increased the net earnings of the New York & Charleston Warehouse & Steam Navigation Co., and will enable it to pay regular dividends upon its stock, besides improving steamship connections of the South Carolina Railway."

"The company contemplates the early improvement of Accommodation Wharf, to which the South Carolina Railway Co. now has the right of access, which improvement, enabling the cars to be loaded directly from the steamers, will economize freight handling, and save the expense of lightering."

Chicago, Burlington & Quincy.

At the close of its last fiscal year, Dec. 31, the road operated by this company was as follows:

	1885.	1884.
Roads owned and leased, miles	3,534,221	3,369,084
Roads leased and worked jointly, and roads for which a fixed yearly rental is paid	111,824	98,293
Total	3,646,045	3,467,377

The company built during the year 180,110 miles of new road, as noted below, and leased the right to use the Winter-set Branch of the Rock Island road from Indianola, Ia., to Avon, 13,531 miles, making a total increase of 193,641 miles. From this is to be deducted the Chillicothe & Chariton road, a loop line heretofore reported as main track, but now classed as second track. This is a decrease of 14,973 miles, leaving a net increase of 178,668 miles during the year.

The equipment consists of 598 locomotives; 280 passenger, 1 stationer, 5 dining and 112 baggage, mail and express cars; 17,885 box and stock, 4,599 flat and coal, and 307 caboose cars; 9 officers' and pay cars, 28 service cars and 1,873 hand and push cars. The increase last year was 11 locomotives; 9 passenger and 3 baggage cars; 1,750 box, 34 flat and 90 caboose cars; 126 hand and push cars.

The general account, condensed, is as follows:

Capital stock	\$76,384,525
Fund d. debt	70,913,508
Contingent liabilities for branch roads	6,011,000
Accounts and balances payable	2,776,741
Profit and loss	6,223,636
Renewal fund	8,000,000
Income account	12,367,370
Sinking funds	10,538,991
Total liabilities	\$192,215,771
Construction accounts	\$105,438,857
Cost of branch roads	41,291,734
Securities of leased and other lines	26,310,836
Sundry investments	610,127
Materials on hand	1,858,025
Sinking funds	8,331,197
Sundry available securities	2,735,552
Accounts and balances receivable	3,357,914
Cash	3,063,529
Total	193,215,771

The only change in stock was the issue of \$3,000 in exchange for Burlington & Missouri River stock. There were \$6,000 Burlington & Missouri River (Nebraska) consols issued for branch bonds, and \$242,100 bonds of various issues canceled for sinking funds, making a net decrease of \$236,100 in the funded debt.

The report gives the following summary of the financial condition of the company:

Permanent investment in construction	\$146,750,591
Sinking funds	8,331,197
Investment in controlled lines	26,140,705
Sundry investments	610,127
Materials on hand	1,858,025
Cash and accounts receivable, etc., in excess of all accounts and bills payable	6,563,821
Total	\$190,254,466

Capital stock \$76,384,525
Funded debt 70,913,508
153,308,033

Excess of assets \$36,945,433

In this statement the amount of funded debt includes the contingent liability for leased lines. The controlled lines include the St. Louis, Keokuk & Northwestern, the Kansas City, St. Joseph & Council Bluffs, the Hannibal & St. Joseph, the Chicago, Burlington & Kansas City, and the Chicago, Burlington & Northern, besides minor lines.

The total expenditure for new construction and improvements on all lines was \$3,858,814, and for new equipment \$1,014,918; a total of \$4,873,732.

The Land Department reports in Iowa sales of 2,740 acres for \$15,554. The cash receipts were \$258,247 and the expenses \$3,824, leaving a balance of \$254,423. The assets amount to \$729,064, including \$573,790 land notes and 16,412 acres unsold. In Nebraska there were 36,904 acres sold for \$301,310. The cash receipts were \$1,025,090 and the expenses \$39,294, leaving a balance of \$985,796. The assets amount to \$3,385,669, including \$2,502,609 land notes and 91,957 acres unsold.

The passengers and freight carried were as follows:

	1885.	1884.	Increase.	P. c.
Passengers	5,134,312	4,519,185	615,127	13.6
Tons freight	8,431,808	7,325,997	905,811	12.4

The number of passengers does not include those carried on season or mileage tickets. The freight includes 355,775 tons carried by the Illinois Central in its own cars.

The earnings for the year were as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Freight	\$19,565,853	\$18,514,431	I. \$1,051,422	5.7
Passengers	5,286,408	5,339,898	D. 53,490	1.0
Mail, express, etc.	1,704,164	1,629,215	I. 74,949	4.6
Total	\$26,556,425	\$25,483,544	I. \$1,072,881	4.0
Expenses	\$14,405,767	\$14,090,746	I. 315,021	2.2
Net earnings	\$12,150,658	\$11,392,800	I. \$757,858	6.6
Gross earn. per m.	7.520	7.497	I. .023	0.3
Net earn. per mile	3.438	3.352	I. .086	2.5
Per cent. of exps.	54.2	53.3	D. .9	1.1

Taxes are included in expenses in both years; they amounted last year to \$533,639, or 4.25 per cent. of the gross earnings.

The result of the year was as follows:

Net earnings, as above	\$12,150,658
Interest, exchange and other income	592,432
Total income	\$12,743,090
Rent of tracks and depots	\$187,171
Interest on bonds	4,294,263
Payments to sinking funds	646,430
Dividends, 8 per cent.	6,110,572
Appropriated to renewal fund	1,000,000
Total	12,238,436

Balance, surplus for the year \$504,654
Net receipts from land grant in Nebraska 985,796
Surplus, Jan. 1, 1885 10,876,920

Surplus, Dec. 31, 1885 \$12,367,370
The surplus over all charges in 1884 was \$511,106, but in that year the appropriation to renewal fund was only \$500,000.

NEW LINES.

The new road added during the year was as follows:

	Miles.
In Iowa:	
Western Iowa, Fontanelle to Cumberland	20.36
Chariton, Des Moines & Southern	0.29
In Missouri:	
St. Joseph & Des Moines, leased and gauge changed	48.81
In Nebraska:	
Holdrege to Elwood	28.22
Omaha to stock yards	4.20
Republican to Kansas line	8.50
In Kansas:	
Nebraska line to Oberlin	60.73
Total	180.11

In addition to these lines the company acquired by lease the right to use the track of the Winterset Branch of the Chicago, Rock Island & Pacific road from Indianola to Avon, 13,531 miles.

Lines on which work has been begun are, in Nebraska, branches of the Nebraska & Colorado from Tobias to Blue Hill; Elwood to Curtis; Fairmont to Geneva, and Edgar to Superior, 142 miles in all; the Grand Island & Wyoming Central, from Grand Island northwest 100 miles; the Omaha & North Platte, from Omaha to Ashland, 26 miles; a branch of the Republican Valley line, Aurora to Hastings, 27 miles. These lines are to be finished in 1886.

The building of the coal road in Colorado has been given up for the present.

IMPROVEMENTS OF ROAD.

The report says: "During the year 15½ miles of second track have been added in Illinois and 9½ in Iowa. The number of miles of second track on Dec. 31, 1885, was: In Illinois, 184½; in Iowa, 67½, and in Nebraska, 3½; total, 255. In Illinois and Iowa during the year 89½ miles of steel rails were laid in branches and side tracks to replace iron rails; 23½ miles of steel rails were laid in new second tracks, and 17½ miles in new side tracks. The total number of miles of steel rails in all tracks east of the Missouri River, on Dec. 31, 1885, was 1,584. This includes the whole main line in Illinois and Iowa. In Nebraska and Kansas during the year, 98½ miles of main line track were relaid with steel rails in place of iron rails; 71½ miles of steel rails were laid in new main track upon the line from Republican to Oberlin, making 901 miles of steel rails in all tracks west of the Missouri River, on Dec. 31, 1885. The general condition of the entire road and equipment has been fully maintained during the year."

CONTROLLED LINES.

"The properties controlled by this company, whose operations are not embraced in the report, show a falling off in net surplus for the year of about \$530,000, the surplus being about \$170,000 in 1885, as against \$700,000 in 1884, after paying their own operating expenses and interest on their outstanding liabilities not owned by the Chicago, Burlington & Quincy Railroad Co. The Kansas City, St. Joseph & Council Bluffs Co. paid during the year dividends amounting to 2½ cent. on its capital stock, yielding to this company the sum of \$131,520, included in the item of interest and other income."

CHICAGO, BURLINGTON & NORTHERN.

"The surprising development of the region about and beyond St. Paul and Minneapolis, and the advantages of connecting the C., B. & Q. system of railroads with it, and with the new outlets from St. Paul to the Pacific Coast, led early in 1885 to the serious consideration by your directors of a project to build a railroad on the east bank of the Mississippi River between St. Paul and Fulton. The St. Paul, Minneapolis & Manitoba Railroad had joined its system at the international boundary line to the Canadian Pacific Railroad, and the Northern Pacific has been completed to a connection with the Pacific Ocean. St. Paul and Minneapolis, from mere villages a few years ago, had grown to be large cities, constituting the local market for a great extent of country, and the traffic between those cities and the markets of Chicago and St. Louis was large and growing. Besides the advantages alluded to of connecting our whole system of railroads with the Northwest for general travel and traffic, as well as with the Pacific Coast by the Canadian Pacific and the Northern Pacific roads, it had become apparent that those portions of Iowa, Nebraska and Kansas through which our lines pass required more direct and easy connection with the lumber of Wisconsin and Minnesota, and it seemed reasonable to suppose, also, that a line between the coal-fields of Illinois and the North, where no coal has yet been discovered, would obtain a more or less profitable business from that source."

"In the summer of 1885, your directors decided to assist the Chicago, Burlington & Northern Railroad Co., which was organized to build from Fulton, along the east bank of the Mississippi River, to St. Paul, about 315 miles, with a branch 47 miles in length from Savanna, about 15 miles north of Fulton, to Oregon, where connection is made for Chicago by way of the Chicago & Iowa and the C., B. & Q. Along the river between Fulton and St. Paul the grades are light, and the line touches many towns of considerable importance, like Dubuque, La Crosse, and others. The distance from St. Paul to Chicago, via Savanna and Oregon, is about 433 miles, and from St. Paul to St. Louis, via Fulton, is 578 miles."

"A contract was accordingly made with the Chicago, Burlington & Northern Railroad Co. and this company, to run for 20 years, for the interchange of traffic, and providing for the purchase by the C., B. & Q. of the first mortgage 3 per cent. bonds of the C., B. & N. Co. up to 105 and interest, to the extent of one-half of the net earnings of the C., B. & Q. derived from business with the new company; it being agreed upon our part that the amount so to be invested shall not be less than \$100,000 in each year, and that the bonds as soon as purchased shall be exchanged for the stock of the C., B. & N. Co. at par."

"In consideration of this contract, and for certain valuable property, rights and franchises which were owned by the C., B. & Q. along the proposed line of the new road, the C., B. & Q. has acquired 30,000 shares of the capital stock of the Chicago, Burlington & Northern Company."